

**EMOTIONAL DISTRESS AND
DEPRESSION IN CHILDREN AND
ADOLESCENTS FOLLOWING
AUSTRALIAN BUSHFIRE DISASTERS**

Submitted by

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A thesis submitted in fulfillment of the requirements for the Degree of Doctor
of Medicine.

Discipline of Psychiatry

School of Medicine

University of Tasmania

August 2004.

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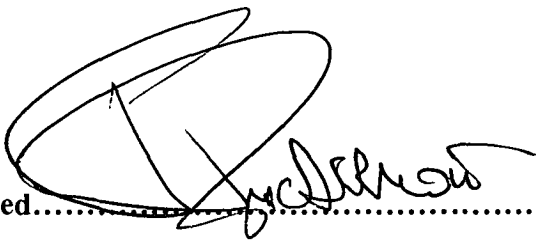
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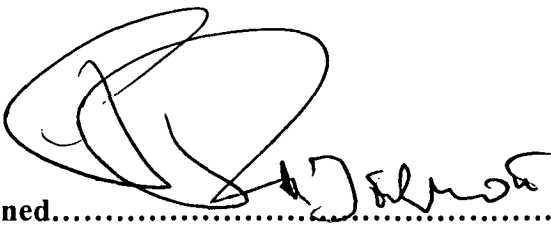
DECLARATION OF ORIGINALITY

This thesis contains no material which has been accepted for a degree or diploma by the University of Tasmania or any other institution. And to the best of my knowledge and belief contains no material previously published or written by another person except where due acknowledgement is made in the text of the thesis.

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ACKNOWLEDGMENTS

The candidate first discussed this project with Associate Professor Stewart Einfeld (UNSW) and was encouraged to attend the inaugural meeting of the intersectoral working group as the departmental (health) representative. Professor Einfeld also contacted Professor W Yule (Institute of Psychiatry, London) to discuss the screening battery. Professors Yule and Einfeld did not play any subsequent role in design, data collection, analysis or writing papers related to this thesis.

Ms Janet Cross was the Area Head of School Counselling Services in the Como-Jennali area of the Sutherland Shire of New South Wales. Whilst Ms Cross was not involved in the research design, without her enthusiasm and commitment it is unlikely the school counsellors in her area would have embraced this project. Further, the task of mass screening across numerous primary and secondary schools required both sensitive discussions with principals and detailed organisational skill. Ms Cross provided both at an extremely high level of competence. Positive outcomes of this research on contemporary child and adolescent mental health practice following a disaster are dedicated to her work and that of her colleagues.

Ms Carly Dean was the team leader of the Sutherland Shire Child & Adolescent Mental Health Team. Ms Dean provided staff to assist with screening and integrated the SBTP treatment package into the clinical and collaborative work of the Sutherland CAMHS Clinic. Ms Dean was assisted by Ms Rina Davies, employed with Australian Commonwealth Disaster Relief Funding and who provided important project and therapy support.

Dr Victor Storm and Mr Don Finlayson were two senior child and youth mental health clinicians; Dr Storm a child and adolescent psychiatrist and Don Finlayson a senior school psychologist. Soon after the bushfire disaster they were approached by the candidate and readily agreed to collaborate to write the major SBTP treatment resource the guided workbook, "The Bushfire and Me".

Dr Lyle Palmer provided analysis support and co-authored two papers (McDermott & Palmer 1999; 2002) and one book chapter (McDermott & Palmer 2002). In this thesis the candidate is responsible for all univariate and bivariate analysis and wrote the section in chapter 5 summarising the principles of generalised equation modelling were written by the candidate. The multivariate analyses

reported in the publications mentioned above were first conducted by Dr Palmer. They were repeated for this thesis by the candidate under the supervision of Dr. Palmer.

The screening of children following the Canberra Bushfire disaster (2003) was conducted by the candidate, Ms Erica Lee and Ms Marianne Judd. Dr Peter Gibbon provided statistical support for the analysis in chapter 14, proof read several chapters and co-authored one paper (McDermott, Gibbon, Lee & Judd, in press).

Professor Philip Hazel provided overall supervision from the analysis stage, proof read all chapters and provided invaluable editorial advice. Professor Ken Kirkby made comments on the final thesis draft

ETHICAL APPROVAL

Ethical issues are discussed in more detail in chapter 5. This research received approval to conduct the school based screening and the intervention study from the Prince of Wales Hospital Ethics Committee and approval to approach school principals to seek cooperation to conduct the study from the NSW Department of School Education, Metropolitan East Region.

ABSTRACT

Given the evidence from epidemiological studies of a substantial unmet child & adolescent mental health service need, it is typical that children with mental health symptoms following a natural disaster are not routinely provided an intervention. However, following a devastating Australian natural disaster the author directed an innovative inter-sectoral response. Proactive, school-based screening for post-disaster mental health sequelae was seen as a way of identifying school-age children with persisting disaster related symptoms. Identified children were offered a targeted mental health intervention. The intervention, a guided trauma workbook for children and group therapy program for adolescents proved to be acceptable to children, parents and teachers as well as being cost effective.

Major study investigations included the emotional responses of Primary and High School children, the proportion of children whose responses met case criteria for emotional trauma or depression and the relationship of these symptoms to trauma related events and factors intrinsic to children such as their level of anxiety and perception of disaster related threat. The responses of children of volunteer fire fighters and younger children who attended infant school were also investigated. Given the large sample size ($n = 2379$ Primary and High School students, $n = 310$ Infant School students) multivariate analyses were able to control for age and gender and investigate the relative contribution of individual factors versus bushfire-related variables to depressive and emotional trauma symptoms. In Infant School children a novel measure of infant trauma responses, the Early Childhood Trauma Self-Report, a combination of a picture, vignette and brief statements followed by yes/no responses was also trialled. Also the relationship of parent-report of symptoms was compared to child-report.

The final analysis chapter reports a replication study following a major bushfire disaster in Canberra, the Australian National Territory. Advances in design included using two new measures of child and adolescent psychopathology: a measure of Post traumatic stress disorder and a general child and adolescent psychopathology screening measure. Changes were also made to improve the disaster related information collected. The thesis concludes with a discussion of research limitations and future research directions in the field of child and adolescent mental health responses to natural disasters.

PUBLICATIONS RELATING TO EMOTIONAL TRAUMA

Referred Journals, Books & Book Chapters relating to emotional trauma research

- STORM V, MCDERMOTT BM, FINLAYSON D. (1994). *The Bushfire and ME. A story of what happened to me and my family.* NSW Department of Health, Sydney.
- MCDERMOTT, BM (1996) The Human emotional response to Bushfire Disasters. *Proceedings of the Linnean Society*, 116:127-132.
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- MCDERMOTT B.M., & GIBBON. P. (2002). Advances, Opportunities and Obstacles in the Epidemiology of Child and Adolescent Mental Health. *Australian Epidemiologist*, 9:21-24.
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- MCDERMOTT, B. M. (2004). Child and youth emotional trauma: an explanatory model of adverse outcomes. *Journal of Psychiatry, Psychology and Law*, 11: 269-279.
- MCDERMOTT, B.M., LEE, E., JUDD, M., & GIBBON, P. (2005). Post Traumatic Stress Disorder and General Psychopathology in Children and Adolescents Following a Wildfire Disaster. *Canadian Journal of Psychiatry*, 137-143.
- MCDERMOTT B.M., GIBBON, P., & LEE, E.M. Infant school children and natural disasters: Results from the Early Childhood Trauma Self-Report.: In TA Corales (Ed.) *Progress in Post-Traumatic Stress Syndrome Research*, pp71-93, Nova Science Publishers, 2005.

Conference presentations that relate to the thesis subject.

- McDermott BM (1994, Oct) The Sutherland Bushfire Trauma Project: Methodology and Preliminary findings. Royal Australian and New Zealand College of Psychiatrists, Child and Adolescent Faculty annual conference.
- McDermott BM (1994, Oct) The response of children following the 1994 NSW Bushfire Disaster: The Sutherland Bushfire Trauma Project. Southern Sydney Mental Health Conference, "Innovation and Evaluation".
- McDermott BM (1995, Feb) A Guided workbook for children traumatised by the 1994 NSW bushfire disaster. Storm V, McDermott B Inaugural National Conference on Child and Adolescent Mental Health. Adelaide.
- McDermott BM (1995, Mar) 4,000 Sutherland Children and other erect bipeds. The case for the human consequences of bushfires. Annual Linnean Society and ANZAAS Conference "Living in a fire prone environment", Sydney.
- McDermott BM (1995, sept) Out of the Fire. Adolescent Group Therapy after a Natural Disaster. RANZCP Child and Adolescent Faculty Annual Conference, Melbourne.
- McDermott BM (1995, Sept) What's in the Black Box: An outline of a children's trauma workbook." RANZCP Child and Adolescent Faculty Annual Conference.
- McDermott BM (1995, Sept) The organisational response after a plane ditching and a protocol of what should happen. The Australian Guidance and Counselling Association Annual Conference, Hobart.
- McDermott BM (1995, Sept) The Screen and the Black Box; Screening 4000 children for post bushfire emotional distress and their subsequent treatment with a guided workbook. The Australian Guidance and Counselling Association Annual Conference, Hobart.
- McDermott BM (1996, Aug) (Invited symposia member) The Sutherland Bushfire Trauma Project: A randomised controlled treatment trial. The 104th Convention of the American Psychological Association. Toronto, Canada.
- McDermott BM (1999, May) (Invited lecture) "The Sequelae of Childhood Stress" Royal College of Physicians, Annual Meeting, Perth.
- McCormack J, McDermott BM (2001, April) Child and Adolescent Eating Disorders and Trauma. London International eating Disorders Conference, London UK.
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- McDermott BM. (Sep. 2002) Mater Child protection and emotional trauma lecture series: Focusing on the mind in child protection. Mater Children's Hospital, Brisbane.
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- McDermott BM. Invited speaker: Society, Systems and Trauma: Do our public processes exacerbate emotional trauma in childhood? (Sept 2003) Trauma and Survival. 23rd Annual Conference Australian and New Zealand Association of Psychiatry, Psychology and Law. Fremantle, WA.
- McDermott BM. Children and natural disasters: A selective prevention program utilizing population-based screening. 16th World Congress of the International Association for Child and Adolescent Psychiatry and Allied Professions:IACAPAP. Berlin, Germany. August 2004.
- McDermott BM, Lee E, Judd M, Gibbon P. Disasters, school age children and psychosocial interventions. 14th Annual TheMHs Conference. Gold Coast, QLD. September 2004

ABBREVIATIONS

DSRS	Birleson Depression Self Rating Scale
DSRSSUM	Total score, Birleson Depression Self Rating Scale
IES	Impact of Event Scale
IESSUM	Total score, modified 13 item Impact of Event Scale
PTSD	Post Traumatic Stress Disorder
PTSD-RI	Post Traumatic Stress Disorder Reaction Index
RCMAS	Revised Children's Manifest Anxiety Scale
RCMASSUM	Total score, Revised Children's Manifest Anxiety Scale
SBTP	Sutherland Bushfire Trauma Project
SDQ	Strengths and Difficulties Questionnaire

CHAPTER 1

OVERVIEW OF CHILD AND ADOLESCENT MENTAL HEALTH

Contemporary research has emphasized the burden of child mental health disorders. The recorded prevalence of child and adolescent mental health problems is similar across many Western countries. Research in the US reports rates of 16 to 22% of youth with a mental health disorder at any one time (Roberts, Atkinson & Rosenblatt, 1998; Costello, Angold, Burns, Erkanli, Stangl & Tweed, 1996), which concurs with Australian rates of 14 to 16% (Zubrick, Silburn, Garton, Dalby, Carlton, Shepherd, Lawrence & Burton, 1995; Sawyer, Kosky, Graetz, Arney, Zubrick & Baghurst, 2000). The Report of the US Surgeon General's Conference on Children's Mental Health (2001), citing the research of Burns and Shaffer (Burns, Costello, Angold, Tweed, Stangl, Farmer & Erkanli, 1995; Shaffer, Fisher, Dulcan, Davies, Piacentini, Schwab-Stone, Lahey, Bourdon, Jensen, Bird, Canino & Regier, 1996) concludes that 1 in 10 US children suffer a mental illness severe enough to cause impairment. In a global context, utilizing the disability-adjusted life year (DALY) methodology, neuropsychiatric conditions are the greatest group of disability causing diseases in the developed world at 23% of all disabilities versus 18% for cardiovascular disease and 15% for malignant cancer (WHO, 1999). Four of the top 10 causes of disability are neuropsychiatric conditions. Major depression was the number one cause of disability in the developed world in 1998 and the burden of neuropsychiatric conditions affecting children is predicted to double by the year 2020 (WHO, 1999).

The importance of these epidemiological findings is now recognized in both the US and Australia. The US response has included a White House meeting on children with emotional and behaviour disorders (March 2000), a US Surgeon General's Listening Session on children's mental health (June 2000), the US Surgeon General's Conference on Children's Mental Health and the subsequent report released in 2001. The incumbent US Surgeon General, David Satcher M.D., summarized, "the burden of suffering experienced by children with mental health needs and their families has created a health crisis in this country" (2001, pg 3).

In Australia a decade of significant development in mental health services has been promoted by the First and Second National (5 year) Mental Health Plans (1992, 1998). There has been some emphasis on youth, especially around the specific issue of youth suicide and the National Mental Health Strategy document, Promotional and Prevention: A National Action Plan (2000). However, the significant need for work in the child mental health area is emphasized by the fact that documents such as the National Standards for Mental Health Services (1997) are not readily applicable to children and their adult carers.

Prospects for a more child focused mental health sector will require significant rethinking of current policy and spending priorities. Children account for 28% of the US population. However, child health funding accounts for 14% of total health funding and only 7% of child health funding is spent on child mental health (2000). This is despite the argument that disproportionately more funding should be spent on young lives that demonstrate greater brain plasticity and where improving developmental trajectories may have lifelong benefits (Shonkoff & Phillips, 2000).

Indigenous and minority children and families are especially important. Race has been demonstrated as an important child mental health variable, independent of poverty and socioeconomic status. Race is an influential factor at many points of the child mental health care pathway. For example, African-American youth referred with a putative behavioural disorder, are less likely to receive a diagnosis of depression and are more likely to receive an intervention in a corrective rather than mental health service (Canino quoted in US Surgeon General's Conference, 2001). Evidence exists that indigenous and minority families experience specific barriers to the current, predominantly clinic- and hospital-based child mental health care system (Halfon, Inkelas & Wood, 1995). In Australia there is a long history of anecdotal evidence suggesting indigenous children and youth experience significant mental

health morbidity. However, as recently as 1996 it was acknowledged there was “...little culturally valid research on Aboriginal and Torres Strait Islander health problems and information on the nature and prevalence of indigenous mental health problems is inadequate” (Report of the National Indigenous Mental Health Data Workshop, 1996). This dearth of information has not been rectified in more recent Australian publications such as the *Mental Health of Young People* (2000) or the *Mental Health Report 2002*. Despite being not as yet clearly elucidated, indigenous people may have stronger perceptions of mental health stigma, feelings that such issues are the families’ responsibility, may experience significant communication, cost and distance barriers, or a greater burden of personal stress and poor parental mental health. Several studies have reported that less than 1 in 5 children with a mental health difficulty receive specialist care (Zubrick et al., 1995; Burns et al., 1995). For the reasons stated above, it is probable even fewer indigenous and minority children receive adequate mental health care.

Inadequate policy is likely to underpin the inadequate provision of child mental health care for indigenous and minority children and their families. From a global perspective, the WHO-Project Atlas researchers examined countries representing 98.7% of the world’s population and reported that 43% of countries had no mental health policies, 23% had no mental health legislation, and that specific policies for minorities and indigenous populations were very rare (WHO, 2001). Child specific mental health policies were not mentioned. There is a current opportunity for developed nations, for example the United States, United Kingdom and Australia, to take a lead in child and adolescent mental health policy development.

There are a number of obstacles to significant progress in child and adolescent mental health. Classification systems remain less than ideal. Both DSM IV (APA, 1994) and ICD 10 (WHO, 1994) follow a categorical tradition. Diagnostic criteria are often based on presentations typical of adults and are less applicable to children and adolescents. Many children and adolescents who fail to meet diagnostic criteria still experience serious functional impairment across varied domains including education, family functioning and peer relations. Categorical diagnostic entities less readily reflect an individual’s developmental trajectory, in turn making the distinction between a continuous and discontinuous developmental pathway more difficult. Further, dimensional constructs such as the internalising–externalising

dimension have evidence of greater predictive validity than categorical equivalents (Achenbach, McConaughy, & Howell, 1987).

Comorbidity remains a clinical and intellectual challenge. For example 40% of children with depression meet criteria for another mental health condition (Goodyer & Cooper, 1993). Comorbidity is even more common (42% to 68%) for children with disruptive behaviour disorders (Danckaerts & Taylor, 1995). Comorbid speech, language and learning disorders are also common and confer further impairment. Indeed clinical complexity of presentation appears to be the norm for children and adolescents presenting to mental health services. In a comparative study of presentations across a range of child and adolescent mental health treatment options, children referred to inpatient and day programs demonstrated a greater breadth of psychopathology as well as significant parent psychopathology and problematic parent use of alcohol (McDermott, McKelvey, Roberts, & Davies, 2002). Cultural difference is part of this complexity. Trans-cultural similarities are also described and include the study of Crijnen and colleagues (1997) reporting gender and parent-report similarities in Child Behavior Checklist (Achenbach, 1991) data across 12 countries.

Understanding child and adolescent mental health presentations is also dependant on how the child's emotional responses and behaviours are constructed from various points of view. When considering child and parent perspectives of the same phenomena, the child-parent behaviour rating concordance is low and in the region of .25 (Achenbach, McConaughy & Howell, 1987). Both Fergusson and Horwood (1995), and Rowe and Kandel (1997) estimated that variations in parent ratings accounts for between 21-50% of the variation in reported child behaviour. It is therefore important in child and adolescent mental health research and clinical work to obtain data from multiple informants, usually both the parent and child.

The necessity of using questionnaires and interviews to obtain diagnostic and aetiological data can impose a significant burden on informants. Attempts to avoid overly onerous questioning has implications especially for population-based studies and necessitates decreasing the field of enquiry to questioning that researchers feel is ethically responsible and financially viable. For example, the Australian National Survey of Mental Health and Well-being (Sawyer, Kosky, Graetz, Arney, Zubrick & Baghurst, 2000) focused only on depression, conduct disorder and attention deficit disorder. National and State policy statements and practice guidelines are influenced

by these research findings as well as further research and development agendas, often with linked funding to investigate issues identified in the research. Lack of high-quality data in other areas, such as Post traumatic stress disorder, has potentially the opposite effect; of impeding service development, funding opportunities, policy development and public awareness in these areas.

1.1 Summary

The focus of this thesis is emotional distress experienced by children and adolescents in a post-bushfire disaster environment. The aim and methodology of this large cross-sectional study will be reported in chapters 5 and 6. The sample is described in chapter 7; the results are reported in chapters 7 to 14. The thesis is summarized and concluded in chapter 15.

It is likely that various factors such as a child's age, gender, past experience and parent and community influences effect post-disaster child and adolescent psychopathology. Developing a meaningful intervention in response to this complexity can only be achieved by first considering an explanatory model of mental health presentations across the child and adolescent age span. Accordingly three introductory chapters are included. This chapter will briefly consider the current status of child and adolescent mental health including current obstacles to research. Chapter 2 will review a developmental model of child and adolescent mental health and in chapter 3 the developmental model is applied to the area of post-disaster emotional distress.

CHAPTER 2

THE DEVELOPMENTAL MODEL OF CHILD AND ADOLESCENT MENTAL HEALTH

2.1 Introduction

An explanatory model of mental health presentations by children and adolescents should be inherently complex. Individuals function as integrated units, made of subsystems that interact vertically (e.g., gene to cell) and horizontally (person to person). Infants, children and adolescents, as integrated units, need also to organise across time. Time course introduces new developmental constructs: novelty of cause and effect of inputs at different developmental stages, differential rates of development across subsystems, critical periods and the interaction with other developing systems such as the changing relationship between parent and child and between parents. This chapter will focus on a developmental approach to understanding child and adolescent mental health presentations. The developmental science perspective subsumes other useful heuristics such as a bio-psycho-social and a systemic perspective. Such an approach is crucial to the Sutherland Bushfire Trauma Project that included data collection from Infant, Primary and High school students and parents. A theme will be complexity, indeed, "recognizing the complexity of development is the first step in understanding its coherence and simplicity" (Carolina Consortium, 1996). It is beyond the scope of this chapter to be an exhaustive discussion of developmental science, rather important developmental constructs and examples will be given. For a more comprehensive account of a developmental approach see the texts of Cairns, Elder and Costello (1996), Rutter and Rutter (1993) or Sroufe (1996).

2.2 Historical issues

A developmental science model differs from historical explanatory models including the psychodynamic model espoused by Freud and elaborated in the child and adolescent field by, Klein, Anna Freud, Winnicott and others. The content of the psychodynamic model is most dissonant with empirical findings in child and adolescent mental health research. However, Costello and Angold (1996) point out the use of the term "development" by Anna Freud, noting Freud advocated, "...abandon thinking in terms of specific causes..." (Freud, 1965 p166). Overall the psychodynamic model included an epigenic approach whereby mastery of a stage was needed before progress to the next stage. It was postulated that non-resolution led to maladjustment in the social, emotional or cognitive domains. Epigenic schema have been a central feature of many theorists in child and adolescent mental health and related fields and examples include the oral and anal stages of Freud, the sensorimotor and preoperational stages of Piaget (Piaget & Inhelder, 1969), individuation and separation stages of Klein and basic trust and autonomy stages of Erickson. Recent more eclectic models are also an advance from the more unitary hypotheses such as the debate between nature advocated by Gessels (1925, 1929) and nurture advocated by Watson (1930), a debate which has continued under various guises including those for and against the "medical model".

The current conceptualisation of developmental science has evolved from consideration of postulated nosological dichotomies; state versus trait, normal versus abnormal, categorical versus continuous. Costello and Angold, in their historical review (1996, p169-177) consider the origins of developmental science to be 19th century efforts to distinguish 'imbeciles' from 'lunatics', later dividing 'moral' from other causes of insanity such as delirium. As previously mentioned the analytical movement introduced developmental concepts into psychiatry, whilst the earlier influence of the child psychology research of Baldwin and Binet, and later Piaget were clearly also developmental. Clarifying that individuals could move in and out of psychopathological states were early findings of mental health epidemiology. Lapouse and Monk (1958) and later Shepherd, Oppenheim and Mitchell (1971) demonstrated the frequency in the community of some behaviours, for instance fears and tantrums, that others considered signs of abnormality. These findings

emphasised a dimensional view of psychopathology, generally more consistent with a developmental view than categorical constructs.

Early descriptive research evolved into investigations that included a follow-up phase. By so doing a disease model could incorporate a developmental construct such as a pathway or trajectory. Early work included the construct of the resilient versus vulnerable child (Rutter, 1985) which emphasized a dynamic relationship between causal and innate factors. For example the Quinton, Rutter and Liddle (1984) study of institutionally reared British women found these women had twice the rate of marital discord as non-institution reared women. However, they had no greater rate of discord if they married for “considered reasons”. The institution reared non-marital discord group also had increased self esteem and self efficacy. Both these factors were influenced by the occurrence of some positive school experience in any domain and in turn were probably influential in their decisions concerning marriage. In the study of Ge and colleagues (1992) of adopted children’s antisocial behaviour, such behaviour was related to the biological parent’s psychological history, as well as both the adoptive parent’s marital warmth and the adoptive parent’s discipline style; a clear demonstration of a complex relationship between biological and environmental factors. This causal complexity promoted a revisiting of the nature-nurture debate and a conceptualisation that nature and nurture, or genes and environment, were not either extremes of a linear relationship. Rather, there exists a dynamic interplay between biology and experience and a “transactional nature of development processes” (Sameroff & Chandler, 1975) which can be broadly considered as, “the ecology of human development” (Bronfenbrenner, 1979).

2.3 A Developmental Perspective

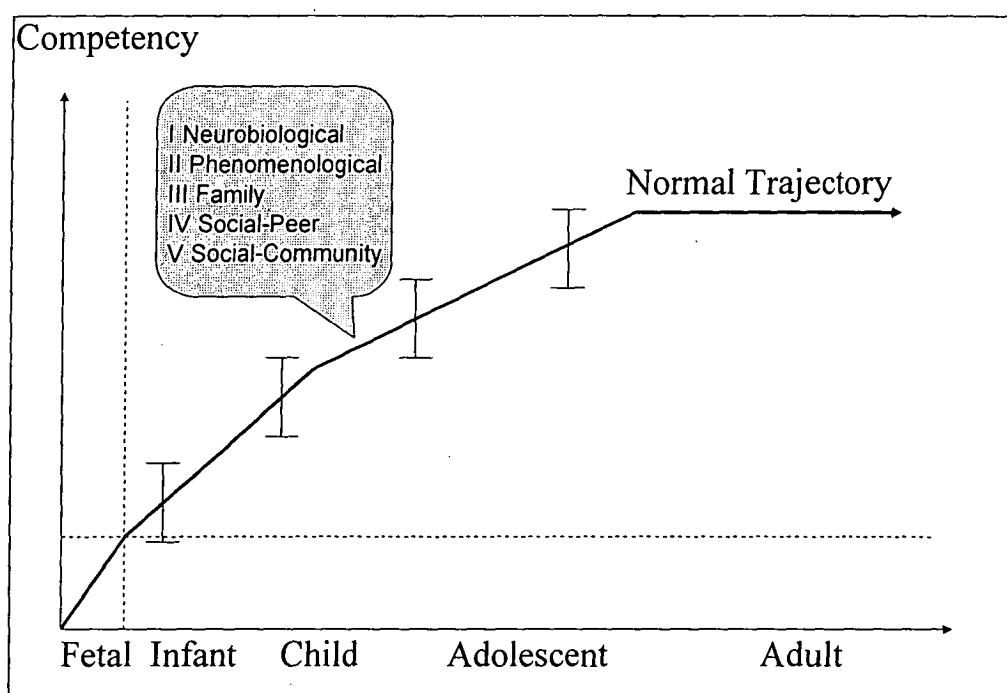
A series of figures will assist in elaborating the developmental perspective. Figure 2.1: Competency, Developmental Epoch and the Normal Trajectory, is a summary of the hypothetical development of a large number of individual's across the fetal to adult life span.

The y axis depicts increasing competency. The x axis equates to time and includes summary descriptors for the major development epochs. The naming of

developmental epochs is a communication tool. Developmental theory allows for continuous development, growth at different velocities in different domains and periods of regression. For most young individuals the overall direction is towards growth. The dotted line represents birth and demonstrates that developmental factors exert substantial influence well before birth.

Figure 2.1

Competency, Developmental Epoch and the Normal Trajectory



In Figure 2.1 and subsequent figures overall competency is considered. A separate developmental chart could be drawn to depict the developmental trajectory over time of one psychological or phenomenological construct such as the mastery of impulsivity, development of antisocial behaviour or the development of depressive symptoms. The line labelled 'normal trajectory' is a summary trajectory of thousands of individuals. The confidence interval bars figuratively depict the range of normality at any given point on the normal trajectory. If functioning is below the

normal trajectory line the individual is said to be developmentally delayed. If above the line the individual's competence is greater than expected for a given age.

The callout box in Figure 2.1 represents the developmental complexity that can be ascribed at any point on the developmental trajectory. The schema, adapted from Costello and Angold (1996), relates to influential factors in the individual's development to that point, and has a prognostic function. That is, if these factors remain constant, a similar developmental trajectory should follow. Five subsystems are enumerated: I Neurobiological including genetic, molecular biology, anatomy, physiology and acquired biological insults such as fetal exposure to infection and toxins; II Phenomenological-Behavioural referring to observable feeling states, symptoms and behaviours; III Family referring to the centrality of parents and the family system to the child's development; IV Social-school relating to peer and adult contact at school, material aspects of the school environment and psychological aspects including the school staff's attitudes towards academic achievement, and policies and procedures around issues such as drug use and violence. Lastly, V Social-community, similar to IV but on a broader level including community resources, parenting, financial, housing and other assistance and community connectedness (adapted from Costello & Angold, 1996 pp178).

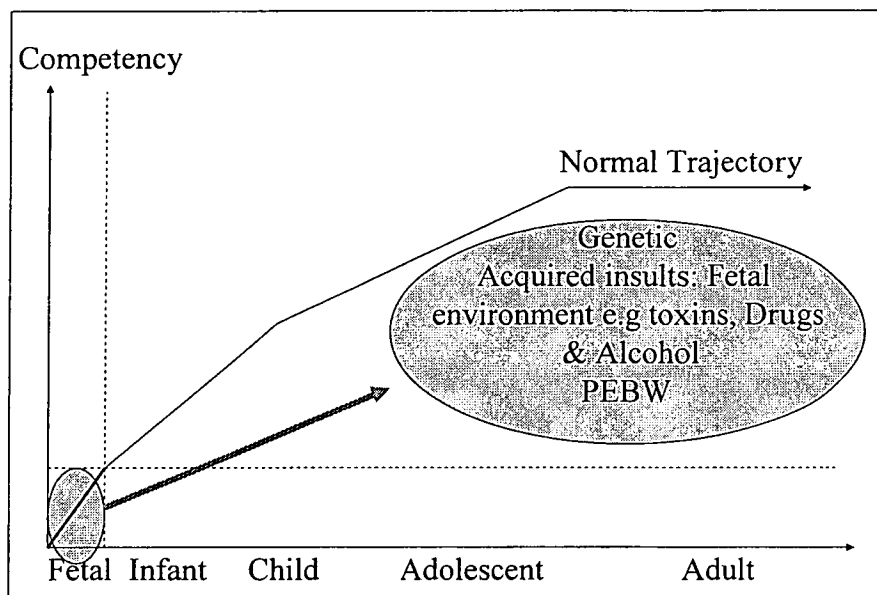
2.4 The Fetal Developmental Period

Figure 2.2 depicts the fetal period of development. Highlighted are examples of major fetal determinants of later health including biological and toxic fetal environmental factors. Possibilities for the latter are many. Examples include infections such as rubella, herpes, human immunodeficiency virus, cytomegalovirus and toxoplasmosis; deficiency states include folate deficiency. Direct toxins include maternal alcohol intake. Whilst many genes function across the lifespan, the genetic determinants of organogenesis occur during the fetal period. The ultimate origin of mental health is the in-utero development of the central nervous system (CNS). The sequence of neuron formation (neuronogenesis) is common to all mammals and involves neuron proliferation from the pseudo-stratified ventricular epithelium of the embryonic neural tube and subsequent non-synchronous migration of neurons to various predetermined CNS layers and positions (Takahashi, Nowakowski &

Caviness, 2001). Post-proliferation CNS development is dominated by the formation of new synapses (synaptogenesis). Phase III synaptogenesis is the most prolific, occurring immediately pre- and post-birth. During phase III synaptogenesis in the Rhesus monkey there are 40,000 new synapses created per second per cortex (Bourgeois, 2001).

Figure 2.2

The Fetal Developmental Period



A large body of research has been reported on birth-weight including the relationship between birth-weight and subsequent mental health. Birth-weight is a poor summary variable of nine months gestation. Percentage expected birth-weight (PEBW), the infant's birth-weight corrected for gestational age, maternal height, age and parity is a more precise variable. Zubrick and colleagues reported that PEBW was a statistically significant independent predictor of Primary school children's total psychopathology and subscale measures such as hyperactivity (Zubrick, McDermott, McKelvey & Silburn, 2000).

Increased knowledge of social factors that effect fetal development has been hampered by research methodological problems. Thus the majority of psychosocial research during the fetal period has been either research of expecting mothers or biopsychological research of infants close to term. Whilst such research lags other neuroscience investigations, psychological factors are nevertheless likely to be

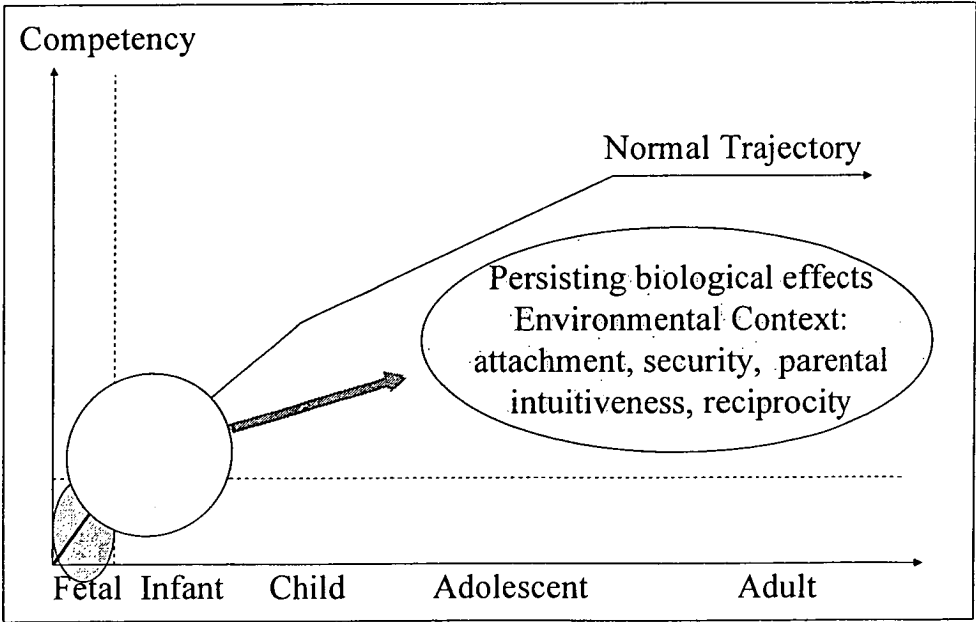
important and include the potential adverse effects of maternal stress, social support and maternal attitudes towards the fetus. The potentially very damaging phenomenon of fetal abuse has been described (Condon, 1986).

2.5 The Infant Developmental Period

Figure 2.3 depicts the major developmental determinants active during the infant period. Consistent with epigenesis many factors discussed during the fetal phase are still influential, others may have ameliorated. Therefore, genetic effects may be life-long such as the influence on development of a chromosomal abnormality. As previously mentioned intrauterine growth retardation presents an ongoing vulnerability throughout childhood.

Attachment, described in Bowlby's seminal paper (1958) emphasises the lifelong drive to form social bonds. Bowlby's theory radically reconceptualised previously held explanations based on drive reduction and learning paradigms (see Eckerman, 1996), expanded Harlow's observations concerning infant rhesus monkey's desire for proximity to surrogate mothers (1958) and built on Lorenz's studies on avian imprinting (1970).

Figure 2.3
The Infant Developmental Period



Attachment behaviours in children were widely conceptualised, including the model of Maccoby (1980), to be manifest from approximately eight to nine months of age with maternal proximity seeking as an early example. Neurobiological research, originally from studies of non-human species, suggests much earlier attachment behaviour. Evidence includes the human infant's recognition of their mother's voice in the hours after birth (de Casper & Fifer, 1980); human newborns ability to locate their mother's breast (Valendi, Porter & Winberg, 1996) and preferential smooth eye tracking around two months of age (Atkinson & Braddick, 1989).

Attachment and psychopathology have been subject to increasing research, often with high risk subject groups. This research has emphasised the dynamic interplay of factors including bi-directional relationships. Increased rates of insecure attachment are documented in the children of depressed mothers (Radke-Yarrow, 1985). In the study of Teti and colleagues (1995) 80% of the offspring of depressed mothers displayed insecure attachment.

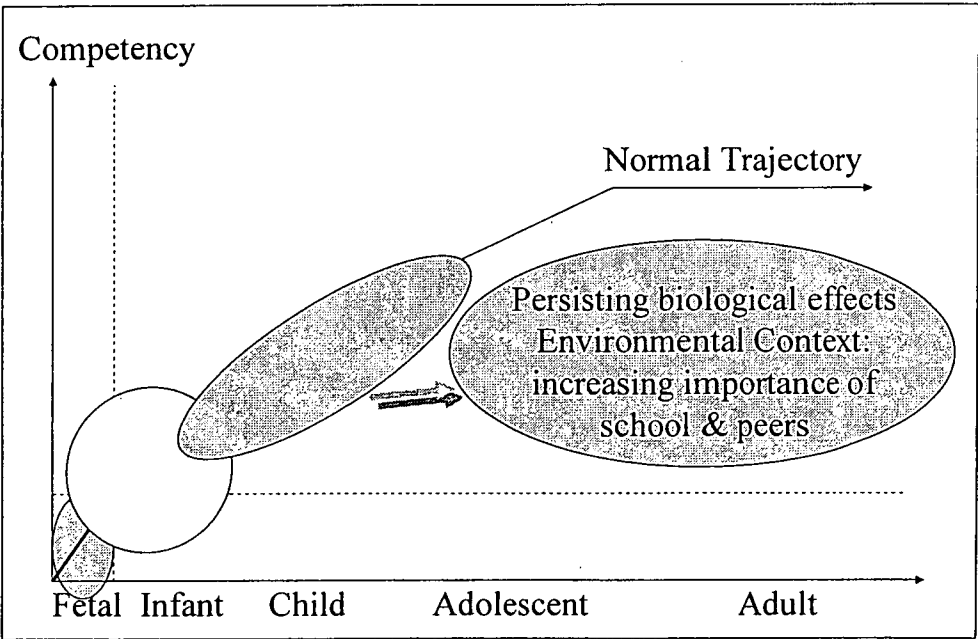
Other adverse outcomes included an infant's delayed expressed language and cognitive development (Whiffen & Gotlieb, 1989). The mechanism of poor infant outcome is multifactorial with evidence of dysfunctional parenting by depressed mothers (Cummings & Davis, 1994), poor parent attachment quality (Cummings & Cichetti, 1990) and the child's development of poor coping skills and possibly non-adaptive cognitive schema (see Hammen, 1999). A postulated example of bi-directionality is insecurely attached infants of a depressed parent are likely to be more difficult to provide effective parenting, thereby conferring more stress on the relationship and potentially worsening the mother's depression.

Attachment also has implications for Costello and Angold's (1996) sections III and V. Attachment to significant caregivers includes fathers and others. Secure attachment to one parental figure can ameliorate an adverse relationship with another. Unfortunately there is a co-occurrence, greater than chance, of post-natal depression in the male partners of women with post-natal depression. This confers a 'double jeopardy' on the infant. Social-community factors also have a role in infant development and include the degree of community assistance and 'scaffolding' of the mother, especially if in a higher risk group.

2.6 The Childhood Developmental Period

Figure 2.4 depicts the childhood period of development. The childhood period occurs after neuron proliferation and the major period of apoptosis (programmed or non-programmed cell death, in part driven by the 'use it or lose it' principal). Neurobiological change in the childhood period is dominated by continued synapse formation. Indeed high synapse density remains until the onset of puberty (Bourgeois, 2001). The period of childhood up to puberty has been described as a time of "continuous (CNS) reorganisation" (Calloway & Katz, 1990) and "fine tuning and maturation" of neuronal circuits (Bourgeois, 2001). Childhood can also be a time for acquired CNS injury including accidents and poisoning which may have grave implications for CNS development, as well as infectious illness such as meningitis and rare neurodegenerative conditions.

Figure 2.4:
The Childhood Developmental Period



Many of the developmental processes of the infant period continue during childhood. There is increasing evidence of the persistence of the infant pattern of attachment. Research includes follow-up of children reared in institutional nurseries

who later experienced peer relationship difficulties despite being adopted into socially advantageous homes (Hodges & Tizard, 1989). The continuity of attachment style post infancy has also been studied in animal models. Harlow (1958) demonstrated current attachment style in rhesus monkeys was related to current environmental context as well as enduring attachment style which demonstrated considerable continuity over time.

Changes in social development are marked during the childhood period and include a move from solitary play to parallel and cooperative play. The latter is important in the burgeoning understanding of the perspective of others. The social development laboratory is initially the family. However, with time the child develops relationships with non family members, acquaintances with other children followed later by friendships. Relationships during childhood become, "interactions that are better meshed, more complex which involve more fantasy". (Rutter & Rutter, 1993 pp.147). The child period is also a time of social group formation (Sherif, Harvey, White, Hood, & Sherif, 1961), with same-sex groups most typical (Maccoby, 1988). Peers become important, however, it is likely the importance of parents is not diminished. Peer rejection during childhood has major implications including concurrent negative feeling states. The relationship of peer rejection, itself not a uniform construct (Rutter & Rutter, 1993), and psychopathology is dynamic. Depressed children have poorer social relationships (Puig-Antich, Lukens, Davies, Goetz, Brennan-Quattrock, & Todak, 1985), whilst rejection leads to diminished social support, diminished self-esteem and self efficacy and increased deviant behaviours (Rutter & Rutter, 1993. pp 154).

Childhood is a time of continued cognitive, speech and language development. Genetic influence on such development is important and has been demonstrated by the usual genetic research paradigms such as twin and adoption studies (Plomin, 1986). Consistent with the general developmental theme, "evidence is clear cut that both genetic and environmental factors are strongly influential (to cognitive, speech and language development) to a roughly equal degree" (Rutter & Rutter, 1993 pp.210). Environmental issues include evidence of increased IQ scores with manipulation of the environment towards greater advantage. Language development shows similarities with retarded development possible due to environmental deprivation (Skuse, 1984).

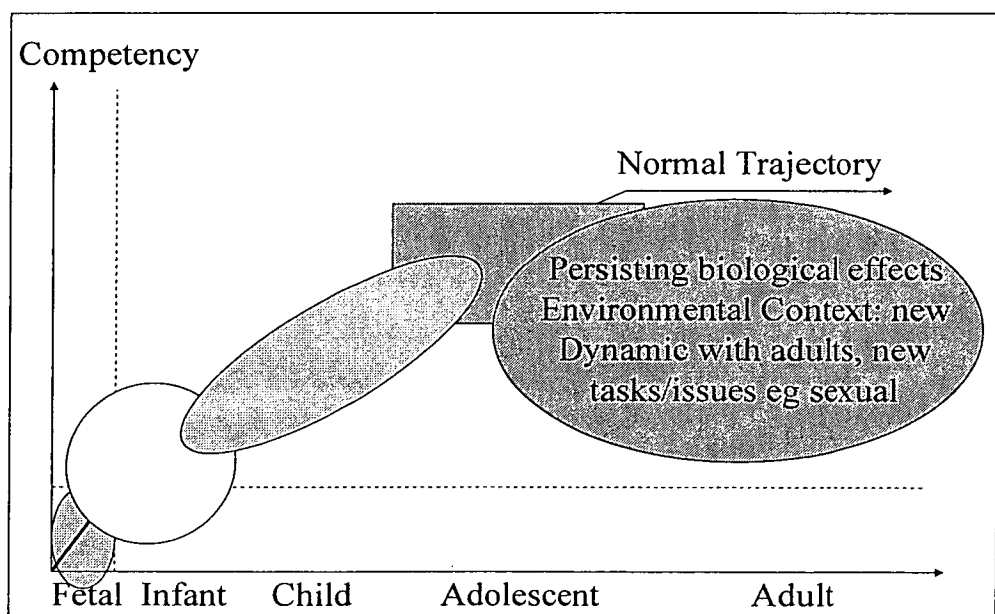
In summary, the childhood period represents a period of significant gains across developmental systems and maturation of significant and essential constructs including a sense of self, relationship formation, speech, language and cognitive development, in the context of past attachment style and concurrent parenting and environmental factors. The childhood period terminates with the normal developmental discontinuity of the onset of puberty.

2.7 The Adolescent Developmental Period

Figure 2.5 depicts the adolescent period. Early adolescence, occurring approximately two years earlier in girls than boys is typified by the hormonal changes of puberty and the biological effects these changes have on body morphology including the distribution of body adipose tissue, height growth velocity and the development of secondary sexual characteristics.

Figure 2.5

The Adolescent Developmental Period



Whilst the importance of sex chromosomes on the hypothalamic-pituitary-ovarian axis is well documented, recent research has highlighted the role of sex hormones in the development of the central nervous system. There is increasing evidence that sex hormones are implicated in critical periods of CNS organisational change, probably during mid-gestation (Cameron, 2001). For example exposure to gonadal hormones promotes masculine sex differentiation. A second phenomenon occurring at puberty, activational effects interact with early organisational effects to ensure secondary sexual characteristic development. Behaviour that has some gender separation such as aggression and the proclivity to depression in adolescent females may have much of its origins in gender-based dimorphic brain development and later activation (Cameron, 2001).

New exogenous and potentially damaging biological factors may first occur during the adolescent period and include the increased availability of illicit substances. Often equally damaging is the use of licit substances such as cigarettes, alcohol and inappropriate use of over-the-counter medication.

Adolescents are capable of more complex, abstract, self-reflective thinking. This may be manifest in further development of a sense of self. Whilst Erickson's (1950) claim that this task requires an "identity crisis", this is not supported by empirical evidence (Rutter, 1976). Some adolescents do experiment with personas and ways of relating prior to more stable behaviour and a behavioural phenotype. Metacognition (thinking about one's own thinking) and greater introspection are likely to be important in this process. Greater self-identity is dynamically related to the development of personal moral and political values, religious beliefs, sexual orientation and future vocational aspirations.

Social-school issues are important and during early adolescence include negotiating the transition from primary to secondary schooling. Many see this transition has a positive experience. If coincidental with a second stress such as parent divorce the transition can be more problematic (Rutter & Rutter, 1993). Peer relationships and group identification is a feature of adolescence. With time the grounds for friendships change from mutual activities to shared beliefs and values.

Social-community factors including social mores are influential in determining behaviour. Societal values act as a sounding board for individual adolescents and adolescent groups in formulating a stance on community issues. For example, the onset of adolescent dating and puberty is weakly correlated (Feldman &

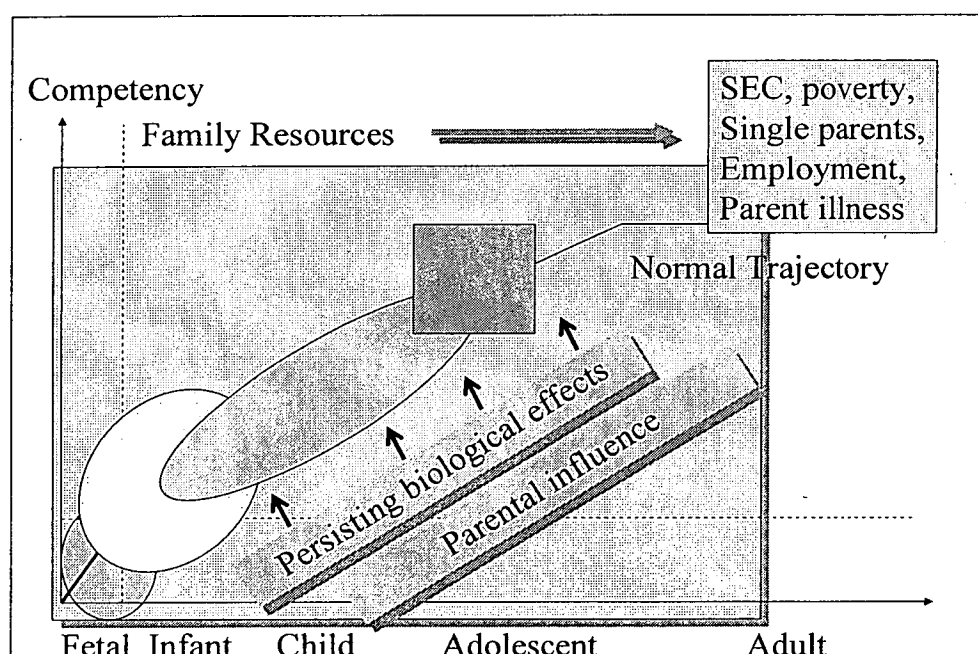
Elliot, 1990) suggesting dating is influenced by peer and community norms. Similarly, sexual activity varies across cultures and across ethnic groups within cultures (Hofferth, Kahn & Baldwin, 1987).

2.8 Development and Family Resources

Figure 2.6 emphasises that at all stages of the development of an individual their progress is embedded in the family's resources, both financial and emotional.

Figure 2.6

The Importance of Family Resources



Examples from figure 2.6 include social economic class (SEC), poverty, family structure, employment and parental illness. There is a large literature that has established a relationship between socioeconomic disadvantage and child and adolescent behaviour problems (Schneider, et al., 2003), specific disorders such as conduct disorder (Kuperman, et al., 1999) and underlying explanatory processes such as a greater likelihood of developing an external locus of control and absence of active problem solving (Bosma, van de Mheen & Mackenback, 1999). An important

distinction, somewhat analogous to birthweight as an explanatory variable, is that low socioeconomic status is a summary of a complex variety of constructs that individually and synergistically confer disadvantage.

Figure 2.6 also extends the overall model by highlighting two influential phenomena that are ongoing; biological effects such as an individual's genetic vulnerability or advantage and persisting parental influence. Examples of the latter include Paterson's research on a child's outcome when exposed to persistent coercive parenting (Patterson, DeBaryshe, & Ramsaw, 1989). Parental influence, as depicted in figure 2.6 could be relabelled to refer to any non-biological, environmental factor, thus highlighting that genetic and environmental factors are not static, rather influence the individual's trajectory across the lifespan.

2.9 Culture and the Developmental Model

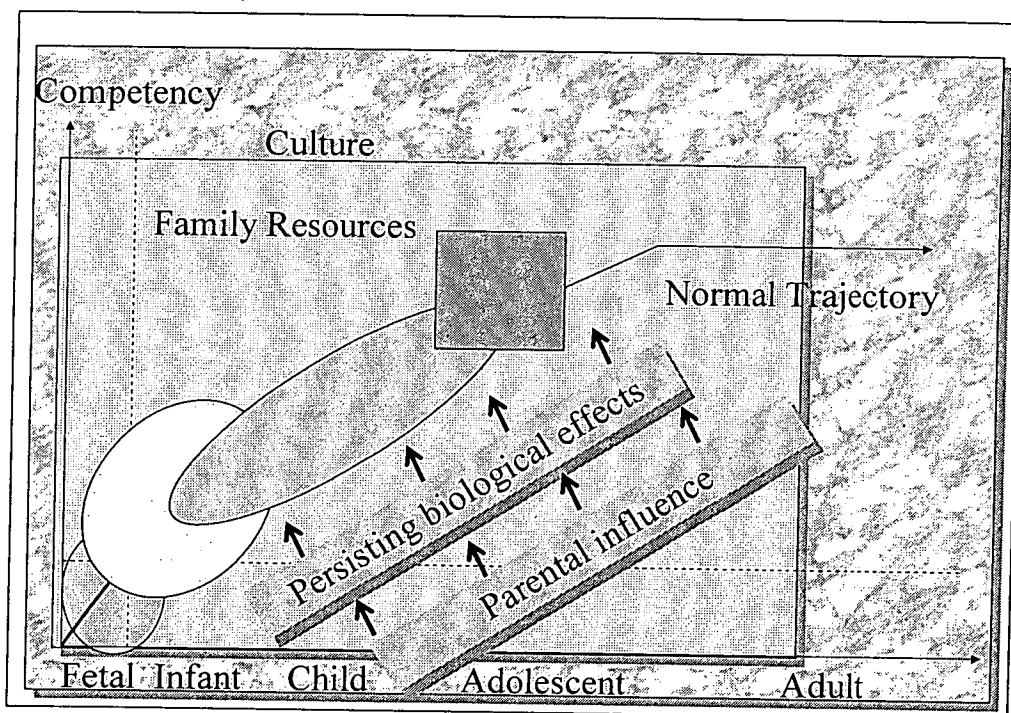
Figure 2.7, the final version of the developmental model extends previous depictions with the embedding of other constructs in culture, both the dominant culture of a given society and ethnic and minority variants within cultures and the tension inherent to such divisions. There is ample evidence of cross-cultural differences that are relevant to child and adolescent mental health. Child rearing and discipline practices (Edwards & Kumru, 1999), sex roles (Favazza & Oman, 1978), and the relative importance of individual autonomy versus group endeavour and attribution style, and the influence of religious and philosophical belief systems are important considerations. Culture itself is dynamic with cultural expression being both situation-specific and population-specific and variations with acculturation and ethnic identification occurring over time (Canino & Inclin, 2001).

The implications of culture are not trivial; rather Eckersley (1993) notes a variety of potentially toxic effects of Western cultures and the likely implications of culture on rates of youth suicide, mental disorders and drug abuse (1993). Like other aspects of the developmental model, culture exerts a transactional and developmental effect on the individual's mastery of self and the environment.

In conclusion, child and adolescent mental health can rarely be understood by an analysis of an individual's mental health signs and symptoms at any given point in time. Such a cross-sectional model cannot summarise the complexity of biological, psychological and socio-cultural factors that have influenced the individual's development prior to that point, nor the complex and changing relationships with peers, parents and other important figures such as teachers. Further, a cross-sectional model has limited prognostic power whereas a developmental model describes the developmental trajectory of the individual prior to presentation and has value in predicting future functioning.

Figure 2.7

Culture and the Final Development Model



Understanding the complexity of development allows formulation of an individual's presentation in a broad sense. Interventions based on a developmental understanding are also broad, often multi-domain and more likely to include a greater range of significant aetiological factors and influences that may be maintaining the presenting challenges. Such an intervention would consider the neurobiological status of the individual along with psychological factors known to be related to the presenting challenges. A developmental intervention would also consider whether

the intervention was age and stage appropriate, delivered in a natural setting, indeed settings where the problem was often manifest and would include parents, friends and teachers in obtaining a positive outcome.

The following chapter applies the developmental model to post-traumatic presentations in children and adolescents. In chapter 13 the developmental model is again discussed in reference to the treatment intervention used in the Sutherland Bushfire Trauma Project.

2.10 Summary

The cornerstone of any understanding of child and adolescent mental health is the integration of knowledge across a range of domains, applied across the developmental time span and considered not in isolation but in a dynamic interaction between such factors.

This discussion emphasises a developmental science approach, where at any point on an individual's developmental trajectory influential factors include neurobiological, phenomenological, family, peer, school and social-community factors. The emotional and material resources of the family and cultural factors are also very relevant. Complexity of interaction of these diverse variables is a feature of development within the constraints of unifying principles such as a general tendency to organise behaviour, critical periods, and vertical as well as horizontal integration. The subject is important to the Sutherland Bushfire Trauma Project given project participants encompassed the Infant to Senior High school grade range.

CHAPTER 3

OVERVIEW OF POST

TRAUMATIC STRESS DISORDER

IN CHILDREN AND ADOLESCENTS

3.0 Summary

Child and adolescent emotional trauma research has developed from literary references to a more methodologically rigorous body of knowledge. This has been promoted by advances in nosology including the description of developmentally congruent child and adolescent psychopathology. Over the last one to two decades child and adolescent post-disaster reactions have been researched across a variety of man-made and natural disasters, child and adolescent age spans and sample sizes. Aetiological theories have been informed by these studies and reflect the increasing complexity of PTSD findings. This chapter firstly describes the historical changes in this field then summarises developments in classification, epidemiology, aetiology and clinical presentations of children and adolescents with post-disaster emotional distress and PTSD.

3.1 Introduction

Natural and man-made disasters, when they occur, frequently affect children and adolescents. School children are at risk of travel-related trauma when on excursions or holidays. Despite the frequency of children and adolescents being involved in disasters, research concerning the emotional sequelae of trauma in the child and adolescent population significantly lags that in the adult population.

There is a long history in medical writing and literature describing the adult psychological sequelae from trauma. Reports include DaCosta's Syndrome following the American Civil War, "Shell Shock" following World War I, and "War Neurosis" after World War II. More recently emotional trauma incurred during the Vietnam War led to the inclusion of Post Traumatic Stress Disorder (PTSD) in The Diagnostic and Statistical Manual Third Edition (APA, 1980), and subsequently in DSM IV (1994).

The child and adolescent professional's appreciation of post-traumatic symptomatology has gradually changed over the last 150 years. Benedek (1985) noted an initial 'Empirical period' (1850-1920), typified by observation and a focus on mental hygiene. The 1930s-1940s was described as a period of 'alarm' (Benedek, 1985). Bowlby in his post World War II investigations with the WHO (Bowlby, 1951), and Spitz (1946) at a similar time provided observational evidence of widespread emotional distress amongst children. Earlier, Freud and Burlington stated the child's wellbeing was positively correlated with the parental sense of wellbeing, parents were thus implicated in the understanding of childrens' adverse emotional responses to trauma (Freud & Burlington, 1943). The importance of the peer group and other significant post-disaster human relationships were also noted. During this period syndromes such as anaclitic depression were described (Spitz 1946) and new theoretical constructs gained prominence (Benedek 1985).

Benedek described the 1950s as a time of 'synthesis'. The developing knowledge of child temperament and the interplay of biological and experiential factors led to the concept of the stress resistant child. This was further synthesised by Rutter's writings on the child who was resilient in the face of adversity (Rutter, 1985).

A parallel, though delayed development was also occurring in the area of the physically abused, battered and sexually abused child. As late as the 1950s prominent reports (Kinsey, 1953) acknowledged the prevalence of child-adult sexual relations. It has only followed the influential publications of 'The Battered Baby Syndrome' (Kempe

1962), 'The Sexual Abuse Accommodation Syndrome' (Summit, 1983) and more recent epidemiological studies that professional and public denial of this traumatic experience has been challenged.

Benedek's (1985) final period, the 'Experimental-Theoretical', described the present situation in which more rigorous research methodology is being employed in child and adolescent emotional trauma research.

There is now strong evidence that children and adolescents can be emotionally traumatised by disasters. Chronic distressing symptoms such as nightmares and frightening intrusive memories (Pynoos & Eth, 1986; McFarlane, 1987a; Yule & Williams, 1990) are frequently reported. DSM IV does not provide separate child and adolescent diagnostic criteria for PTSD (APA, 1994). However, it does note that some manifestations are developmental stage related including the presence of post traumatic play. In children and adolescents psychological impairment is indicated by lowered functioning across broad domains such as diminished academic achievement (Kinzie, Sack, Angell, Manson & Rath, 1986) and an altered family style of interaction (McFarlane, 1987b).

Research on traumatised children include Terr's descriptive reports (Terr, 1979, 1983, 1994) of a group of school children who were taken hostage. More rigorous research methodology includes the studies of Pynoos and colleagues on child survivors of a school sniper attack (Nader, Pynoos, Fairbanks & Frederick, 1990) and more recently Yule's research on adolescent survivors of two shipping disasters (Yule & Udwin, 1991). The latter used a battery of self report questionnaires to assess psychopathology in adolescent survivors. During the second half of the 1990s there has been a rapid increase in child trauma research across many disaster scenarios. Several studies (LaGreca, Silverman, & Wasserstein, 1998; Vernberg, Silverman, La Greca, & Prinstein, 1996) have been able to test a priori explanatory models in the post-disaster environment.

The measurement battery of Yule and colleagues, with age appropriate modifications was used in this project; The Sutherland Bushfire Trauma Project (SBTP) and is described in section 5.6.2 to 5.6.4. The measures were used to screen children for persisting post-disaster psychopathology. Screening was advocated as an advance in this field because of the ability to rapidly identify children suffering distress and provide a targeted intervention rather than a more traditional model of children and adolescents

being referred for treatment. Screening, including relevant ethical considerations is discussed in sections 4.4.1 and 6.5.1.

3.2 Classification

PTSD was introduced into the DSM III classification (APA, 1980) under the rubric of anxiety disorders. There was initial controversy over whether PTSD was a disorder or whether it represented a normal response to an abnormal experience. Uncertainty also existed whether PTSD phenomenology was more similar to phenomenology typical of dissociative or anxiety disorders.

PTSD continues to be classified as an anxiety disorder. However, significant differences with the other anxiety disorders have emerged. A consistent distinguishing factor is the presence of re-experiencing phenomena, together with the temporal relationship of psychological symptoms to the traumatising event.

3.2.1 DSM IV criteria

Consistent with DSM diagnoses since DSM III, PTSD is described in DSM IV (1994) as a categorical entity, with mandatory features and the requirement of meeting a minimum number of features in each symptom cluster. Key features include:

Criteria A. The development of symptoms following a psychologically traumatising event that is outside the range of usual human experience. This stressor is usually accompanied by intense fear, terror and helplessness. It is mandatory to fulfil criteria A.

Criteria B. Characteristic re-experiencing symptoms including: (1) recurrent and intrusive distressing recollections of the event, (2) recurrent distressing dreams of the event, (3) acting or feeling as if the traumatic event were recurring, (4) intense psychological distress at exposure to internal or external cues that symbolise or resemble an aspect of the event and (5) physiological reactivity on exposure to internal or external cues that symbolise or resemble an aspect of the event.

Criteria C. Persistent avoidance of stimuli associated with the trauma including (1) efforts to avoid thoughts, feelings or conversations associated with the trauma, (2) efforts to avoid activities, places or people that arouse recollections of the trauma, (3)

inability to recall an important aspect of the trauma, (4) marked diminished interest or participation in significant activities, (5) feeling of detachment or estrangement from others, (6) restricted range of affect and (7) sense of foreshortened future.

Criteria D. Persistent symptoms of increased arousal including (1) difficulty falling or staying asleep, (2) irritability or outbursts of anger, (3) difficulty in concentrating, (4) hypervigilance, and (5) exaggerated startle response.

DSM IV specifies that to meet PTSD diagnostic criteria the individual must meet one or more criteria from cluster B, three or more in cluster C and two or more in cluster D. The disorder duration must be greater than one month. DSM IV also includes the qualifying comments that the disorder can be acute (less than 3 months) or chronic, and that it can be of delayed onset if symptoms began more than 6 months after the event. Qualifying comments about children include the presence of somatic symptoms, the clinically relevant fact that many children do not discuss their traumatic feelings and the inclusion of survivor guilt in the established PTSD symptoms. DSM IV includes many diagnostic criteria notes specifically related to children. For Criteria A children may express “disorganized or agitated behaviour”, re-experiencing symptoms may include post-traumatic play, frightening dreams may be of “unrecognizable content” and “trauma-specific re-enactment may occur” (DSM IV, 1994).

3.2.2 ICD 10 (International Classification of Diseases 10th edition)

ICD 10 (1994) has a separate category for reactions to severe stress. Disorders are identified by symptoms, course and aetiology, i.e. exceptionally stressful life events. Disorders include:

Acute stress reaction; A self limiting condition in previously normally functioning individuals. Symptoms last for hours or days and then subside.

Posttraumatic stress disorder. This classification is similar to the DSM IV category of PTSD. The requirement of an exceptionally catastrophic precipitating event is similar, symptoms with an emphasis on re-experiencing phenomena, less so on the presence of emotional numbing and the restriction of affect. ICD 10 states that predisposing personality traits and past history are neither “sufficient nor necessary” to explain the onset of PTSD (WHO, 1992) and that the disorder should arise within 6 months of the trauma.

3.3 Epidemiology

Estimates of the incidence of PTSD vary greatly. Uniform PTSD rates would be unexpected given every disaster or traumatic event is unique. Further, even if individuals experienced the same event their perceptions could not be identical in every respect. Take for example an armed robbery at a bank. In this situation the employee directly confronted by the assailant and towards whom a weapon was aimed has a very different experience from the employee serving customers immediately to their right or left.

A second cause of variability in the estimates of the incidence of PTSD is variation in research design. Published research varies in the elapsed time since the disaster, developmental stage of participants, whether the child or parent was the primary informant and instruments used to measure psychopathology; the latter range from qualitative accounts, self-report questionnaires to structured diagnostic interviews. Some early studies included data obtained from mental health professionals working for either the plaintiff or defence in lawsuits after a disaster (Gleser, Green, & Winget, 1981; Green, Korol & Grace, 1991). Examples of the variability in PTSD prevalence include Terr's report that 100% of children who were kidnapped from Chowchilla, California and subsequently endured 28 harrowing hours in captivity experienced 'psychic trauma' (Terr, 1979). Using self report questionnaires Yule found 41% of adolescent girl survivors of a shipping disaster where above standardised adult cut-off scores for post traumatic distress (Yule, 1991). Using semi-structured interviews and more strict diagnostic criteria Pynoos and Eth reported 94.3% of school children trapped in a school playground by sniper fire suffered PTSD (Pynoos, Frederick, Nader, Arroyo, Steinberg, Eth, Numez & Fairbanks, 1987). Post-disaster PTSD was not always found. Earls and colleagues investigated children's responses to severe flooding and reported no child met diagnostic criteria for PTSD. Although limited symptom PTSD and other anxiety disorder presentations were recorded (Earls, Smith, Reich & Jung, 1988).

Clearly a comparison of these events can only be undertaken in general terms and should include a comparison of the methodological differences. Design factors that may influence estimates of the incidence or prevalence of PTSD include bias due to selective mortality, recall and interview bias and use of convenience samples (Bromet & Dew,

1979). Some research limitations are understandable given the post-disaster environment is a less than optimal setting to conduct applied research and the ethical aspects of such research. Significant ‘unpacking’ of the event, both of event-related variables and the personal meaning of the event is required for a more meaningful comparison. Disaster domains useful in designing research were summarised by Wilson and colleagues and include: the degree of life threat, the speed of disaster onset, dislocation from home and community, potential for recurrence, exposure to death and destruction, the individual’s role in the disaster, the proportion of a given community affected and the organisational response to the event (Wilson, Smith & Johnson, 1985).

Research of child and adolescent responses to man-made and non-natural disaster events has been highly influential on the understanding of children’s responses to natural disasters. Publications include the seminal work by Terr, Kinzie, Pynoos and Yule mentioned above. Other than Kinzie’s work (Kinzie, Sack, Angell, Manson & Rath, 1986) with children who survived the “killing fields” of Cambodia, a unifying theme is that these traumatic events were sudden, paroxysmal one-off events, in this respect not dissimilar to a sudden, unexpected natural disaster. It is more difficult to extrapolate research findings from children who experienced chronic sexual or physical abuse and more systemic and prolonged trauma such as surviving genocidal regimes. This distinction in trauma aetiology will be discussed further in section 3.4.

Table 3.1 summarises some of the traumatic event and disaster scenarios investigated. Much of the post-natural disaster research has followed hurricane disasters effecting the eastern seaboard of the United States and hurricanes that have devastated Hawaii.

Shannon and colleagues (1994) using a self report PTSD instrument, the PTSD-Reaction Index (Frederick, 1985; Frederick, Pynoos & Nader, 1992), surveyed 5,687 children 3 months after Hurricane Hugo. Using the instrument authors’ suggested caseness cut-off scores, a post traumatic distress rate of 5% was reported (Shannon, Lonigan, Finch, & Taylor, 1994). This group tested an explanatory model that included event-related factors as well as factors intrinsic to the individual. They reported gender, younger age, high trait anxiety and emotional reactivity during the hurricane independently predicted PTSD symptoms, more strongly than self-report hurricane exposure (Lonigan, Shannon, Taylor, Finch, & Sallee, 1994). Vernberg and colleagues using similar measures reported 25% of children in the “severe” PTSD symptom range

and 5% in the “very severe” range 3 months following Hurricane Andrew (Vernberg, Silverman, La Greca, & Prinstein, 1996).

Table 3.1:

Examples of Child and Adolescent Disaster Research

<u>Disaster Year</u>		<u>Sample</u>	<u>Elapsed</u>	<u>Primary</u>
<u>Type</u>	<u>Published</u>	<u>n (age: years)</u>	<u>time (months)</u>	<u>Author</u>
Flood	1988	39 (6-17 yrs)	12/12	Earls
Flood	1991	179 (2-15 yrs)	12/12	Green
Hurricane	1994	5,687 (9-19 yrs)	3/12	Shannon
Hurricane	1995	144 (6-11 yrs)	2/12 & 8/12	Shaw
Hurricane	1996	568 Elementary	3/12	Vernberg
Hurricane	1998	92 (Grade 4-6)	3/12	LaGreca
Hurricane	2002	4258 (Grade 2-6)	24/12	Chemtob
Bushfire	1987	808 (5-12 yrs)	8/12	McFarlane
Bushfire	1999	601 (8-12 yrs)	6/12	McDermott
Bushfire	2001	2379 Grade 4-12	6/12	McDermottt
Earthquake	1995	212 school age	18/12	Goenjian

Goenjian and colleagues (1995) investigated children’s responses to the 1988 Armenian earthquake disaster, a devastating disaster that caused the death of approximately 25,000 people and resulted in approximately 530,000 individuals becoming homeless (1995). 218 children, mean age 13 years were reviewed 18 months after the disaster and their mean PTSD-RI score remained in the PTSD case range (Goenjian, Pynoos, Najarian, Asarnow, Karayan, Ghurabi, & Fairbanks, 1995). A second sample of 11-13 year olds interviewed 30 months post disaster, on average endorsed 9 of 17 PTSD items on a structured diagnostic interview (Najarian, Goenjian, Pelcovitz, Mandel, & Najarian, 1996).

Prior to the SBTP McFarlane (1987a) studied children’s responses to a bushfire disaster; on parent-report 13% of children experienced dreams or nightmares about the bushfire 8 months after the event (McFarlane, 1987a).

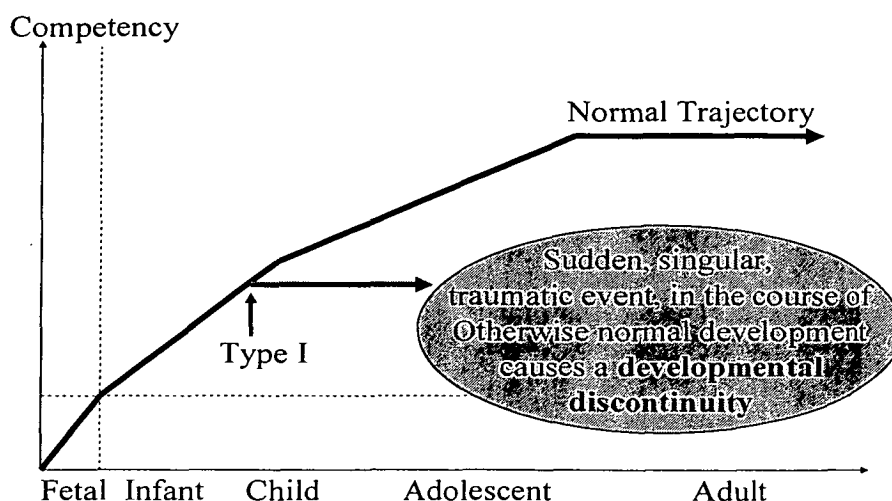
3.4 A Developmental Heuristic of PTSD: Type I and II PTSD

A developmental model of child and adolescent mental health was the topic of chapter 2. Lenore Terr (1994) applied a developmental model to the nosology of emotional trauma in children and adolescents and used the terms Type I and Type II trauma to describe the developmental concepts of a trajectory that was a continuity or discontinuity (Terr, 1994). Terr noted Type I events were sudden, paroxysmal, unexpected events. Such events did not occur against the background of repetitive exposure to traumatic events or the likelihood of such events occurring. Examples of Type I traumas include motor vehicle accidents or the experience of severe violence in an environment or society in which this would be considered unusual.

Figure 3.1 depicts the Type I category of Terr. On Figure 3.1, the individual's deviation from the normal trajectory is denoted a developmental discontinuity. Figure 3.2 illustrates the Terr Type II trauma category, the developmental continuity. In this instance the emotional traumas are repetitive and frequent, thought often unpredictable. Some examples of Type II traumas include child sexual abuse, the experience of a child in a war zone or if subject to ethnic cleansing. Such events occur over a protracted period of time and often commence from an early age.

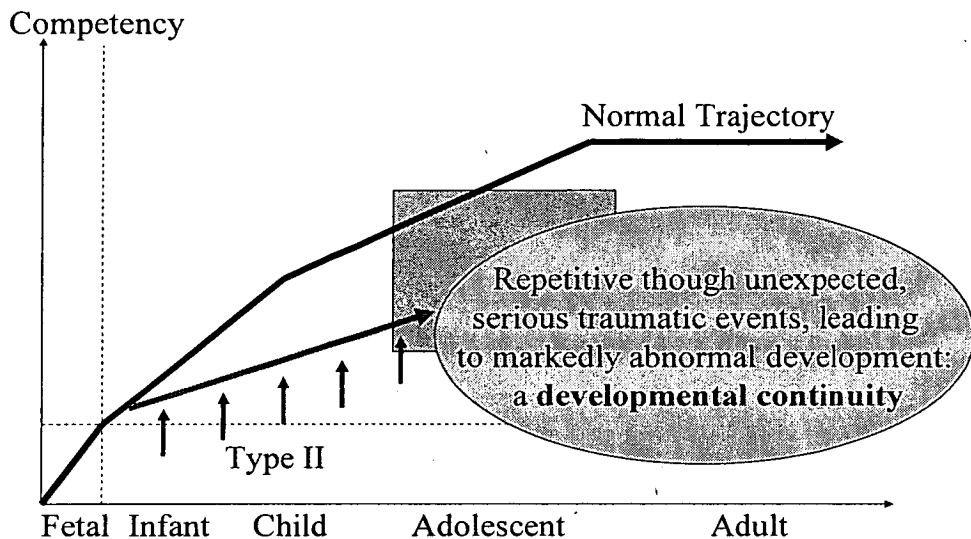
Figure 3.1

Type I Trauma as a Developmental Discontinuity



The scenario of type II trauma is more grave and future psychological impairment may be more fundamental. Traumatic events that occur in early life are likely to lead to transient biological dysregulation. An example is the release of adrenalin in a 'flight-fight' physiological response. Repetitive fear and associated physiological events in response to regular though unpredictable threats to personal integrity may overwhelm the child and may be a significant aetiological factor in the failure to establish mastery and regulation over systems such as impulse and mood control, impairs the development of self-soothing and identity and undermines the ability to create and sustain relationships (Van der Kolk, 1996; Herman, 1997). Very early abuse and neglect are associated with disorganised infant attachment (Carlson, Cicchetti, Barnett, & Braunwald, 1989) and subsequent delayed social skills. In older children avoidant or aggressive behaviour and failure to establish interpersonal play are potential abuse outcomes. In primary school children PTSD symptoms may be related to the most recent or most horrific traumatic event. More usual Type II trauma sequelae are the continuation of earlier abnormal behaviour patterns, poor self esteem and deficits in interpreting the emotions and behaviours of others (Smetana & Kelly, 1989). In older, chronically abused children speech and language deficits are over-represented (Vondra, Barnett, & Cicchetti, 1990). Abuse outcomes are less well understood in adolescents. However, there is evidence that the majority of homeless youth self-report past Type II trauma (Power & Eckenrode, 1990) and it is likely past abuse is an important risk factor in the development of the suicidal behaviour displayed by some adolescents (Wagner, 1997).

Secondary effects may be equally damaging. The 'laboratories' in which children practice regulation are the home and school. If the child's trauma-induced dysregulation leads to habitual negative interactions with others, including aggressive or withdrawn behaviour, it becomes difficult to practise interpersonal tasks such as group membership. If the early life Type II trauma is very severe there is the likelihood of developing a borderline personality structure, including poor ego strength, tenuous sense of self, relationship difficulties, impulsivity and habitual defence mechanisms such as splitting and projective identification. Some authors use the term Complex PTSD to describe the psychopathological consequences of Type II trauma (Van der Kolk, 1996; Roth, Newman, Van der Kolk, & Mandel, 1997).

Figure 3.2*Type II Trauma as a Developmental Continuity*

3.5 Aetiology and the developmental model

A potentially confusing range of causal theories have been advocated for PTSD presenting in childhood. Such theories are often extrapolated from adult research and include psychodynamic, behavioural, cognitive and biological explanatory models. An alternative approach, the developmental model detailed in chapter 2 and section 3.4 is an eclectic, inclusive model that incorporates a variety of research and theoretical elements.

A developmental psychopathology approach suggests that, given variations in a potential victim's integration of biological, emotional and behavioural systems and age appropriate differences in individual-context, individual-peer and individual-family interactions, stressful events may effect individuals in different ways across the life span. Central to such an approach is the idea that effects are transactional between broad categories of events. Some theorists have emphasized environmental, contextual and familial factors and the interplay between such factors (Bronfenbrenner, 1994), that the effects of stressful events are multidetermined (Belsky, 1993), and that no single pathway to a particular outcome is likely (Cicchetti & Toth, 1995). Further, individual

and family characteristics and life experience may be either a protective or vulnerability factor, causation being complex rather than a simple, direct, event-outcome relationship (Rutter, 1989).

An over-arching principle is whether the functioning of the individual with PTSD has diminished. If significant, this diminution will have rendered the individual's functioning below the normal trajectory for age. This does not preclude high functioning in specific areas or indeed overall high functioning, however, the functioning of the individual will be relatively impaired compared to their past performance level. A second principle is that the impaired functioning is due to a combination of trauma event-related factors and factors inherent to the individual and present before the trauma. As outlined in Chapter 2 in children and adolescents non event-related factors also include family, interpersonal and cultural variables. In the schema of Pynoos and colleagues (Pynoos, Steinberg & Wraith, 1995) trauma event-related variables are said to be proximal factors. Factors inherent to the individual and their past experience including constructs such as self esteem or a past history of sexual abuse are described as distal factors.

The event-related factor with the greatest empirical evidence of a relationship with subsequent PTSD symptoms is increased traumatic event exposure. This relationship has been demonstrated across traumatic events studied by a variety of research methodologies. In children studied by Goenjian and colleagues after the Armenian earthquake disaster, children residing in the city subject to least damaged scored significantly lower PTSD scores (Goenjian, Pynoos, Najarian, Asarnow, et al., 1995). PTSD symptoms in children experiencing Hurricane disasters have similarly been correlated with exposure (Lonigan, Shannon, Taylor, Finch, & Sallee, 1994; La Greca, Silverman, Vernberg, & Prinstein, 1996; Vernberg, Silverman, La Greca, & Prinstein, 1996). The importance of event exposure has also been demonstrated in man-made or technological disasters including following shipping disasters (Yule, 1992) and in school students exposed gunfire (Pynoos, Frederick, Nader, Arroyo, et al., 1987). In the latter example the rate of PTSD decreased relative to the decreased proximity to the sniper. Rates of PTSD in children trapped in the school playground were higher than those at school elsewhere, and in turn higher than in children on the way home (on the way home > in the neighbourhood > at home > on holiday). A dose/proximity effect was hypothesised (Pynoos, Frederick, Nader, Arroyo, et al., 1987).

Problems with the exposure concept include difficulties measuring exposure in a standardised format. Recent efforts to improve methodological rigor of exposure measurement include the development of semi-structured exposure questionnaires. Further, high exposure, whilst a potentially useful summary variable is itself a multifactorial construct that includes the perception of threat of death to self and others, an individual's concern about possible loss and bereavement and witnessing a range of disaster related phenomena. The latter includes witnessing death or serious injury, sounds and other perceptual experiences such as smoke from fires and witnessing the coping or lack of coping of parents, carers and other adults.

Dislocation in the immediate aftermath of a disaster has been argued as a positive factor by decreasing disaster exposure and a negative factor given the lack of continuity with family and community and removing the opportunity to constructively engage in post-disaster restorative activities. In a case controlled study of Armenian child earthquake survivors, at 30 months post-disaster there was no difference in PTSD and depression symptoms in a group of children removed from the disaster and those who remained (Narjaren, Goenjian, Pelcovitz, Mandel, et al., 1996).

A range of psychological factors has been studied in child and adolescent disaster survivors. Statistically significantly higher PTSD symptoms have been demonstrated in children with high trait anxiety (Lonigan, Shannon, Taylor, Finch, & Sallee, 1994), and a past history of emotional problems (Earls, Smith, Reich, & Jung, 1988). Other constructs associated with increased PTSD symptoms include children's disaster-related increased perceived threat to themselves (Lonigan, Shannon, Tayler, Finch & Sallie, 1994), children with a subjective sense of low self-efficacy and low social support (Hardin, Weinrich, Weinrich, Hardin & Garrison, 1994), children employing poor coping strategies (Vernberg, Silverman, La Greca & Prinstein, 1996) and an internal causal attribution (Joseph, Brewin, Yule & Williams, 1991).

There have been recent research developments examining neurobiology and PTSD (Cohen, Perel, De Bellis, Friedman, & Putnam, 2002; Bremner, 2002). Whilst a relatively new research area, the range of published reports includes more neurocognitive deficits, specifically in attention and executive functioning in children with maltreatment-related PTSD (Beers & De Bellis, 2002) and neuroendocrine findings of elevated salivary cortisol in children with PTSD symptoms more so than age- and gender-matched healthy controls (Carrion, Weems, Ray, Glaser, Hessel & Reiss, 2002). Neuroimaging findings include no evidence on magnetic resonance brain scanning of

alterations in hippocampal volume (Pederson, Maurer, Kaminski, Zander, Peters, Stokes-Crowe, & Osborn, 2004), yet increased superior temporal gyrus grey matter volume in maltreated children when compared to healthy controls (De Bellis, Keshavan, Frustaci, Shiflett, Iyengar, Beers & Hall, 2002).

Lastly, there have been recent advances in understanding the contribution of genetic factors to emotional trauma sequelae. Caspi and colleagues have investigated the relationship between early experience of maltreatment, later psychopathology and the mediating role of functional polymorphisms of the serotonin transporter gene (Caspi, Sugden, Moffitt, Taylor, et. al., 2003) and the monoamine oxidase gene (Caspi, McClay, Moffitt, Mill, J, et. al., 2002). Utilising data from the Dunedin Multidisciplinary Health and Development Study (McGee, Feehan, & Williams, 1995) individuals who experienced severe maltreatment had a significantly elevated probability of a major depressive episode only if they had the s/s allele in the promoter region of the serotonin gene (Caspi, Sugden, Moffitt, Taylor, et. al., 2003). Similarly, individuals who experienced severe maltreatment had a significantly elevated probability of antisocial behaviour only if they had the low MAO activity allele of the gene encoding the monoamine oxidase enzyme (Caspi, McClay, Moffitt, Mill, J, et. al., 2002).

3.6 Clinical presentation across developmental stages

Developmental approaches have not been widely used in child and adolescent PTSD research, although developmental models for traumatic stress have been published (Pynoos, Steinberg & Wraith, 1995). The clinical presentation of child and adolescent PTSD is dependant upon the child's age, given age is a proxy for underlying developmental constructs such as cognitive, speech and language development, and sophistication of peer and societal relatedness. In areas of psychopathology that have been researched more intensively than PTSD, age-dependant psychopathology relationships are well described. For example, when considering general levels of psychopathology reported by parents, cross-sectional studies have found elevated total symptom scores with younger children (Verhulst & Koot, 1995). This is consistent with total symptom scores decreasing with increasing age over a 4-year longitudinal study (Verhulst, Eussen, Berden, & Sanders-Woudstra, 1993). The age-psychopathology relationship is opposite from a youth perspective. Teenage youth self-report an increase

in total problem scores over a 2-year period from an initial assessment age of 11-16 years (Verhulst & Van Wattum, 1993). Differences in psychopathology across the developmental span are also influenced by gender effects. Verhulst reported increased symptoms of both depressed mood and clinical depression across the 11-15 year age range (Verhulst & Koot, 1995). Whilst Kashani and colleagues, and McGee and colleagues reported a relative excess of depression in females older than 12 years of age (Kashani, 1987; McGee, Feehan, Williams, Partridge, Silva, & Kelly, 1990).

Prior to this research few studies have reported on the relationship of PTSD and developmental stage across the broad school-age range. Conclusions on age effects are difficult to reach from published reports. Findings include no effect of age on PTSD prevalence (Livingston, Lawson & Jones, 1993; Saigh, Fairbank & Gross, 1990; Fitzpatrick & Boldizar, 1993), higher rates of PTSD in older children and adolescents (Sack, McSharry, Clarke, Kinney, Seeley & Lewinsohn, 1994; Nader, Pynoos, Fairbanks, Al-Ajeel & Al-Asfour, 1993; Wolfe, Sas & Wekerle, 1994) and higher rates in younger children (Weisenberg, Schwarzwald, Waysman & Zahava, 1994). These issues are discussed in more detail in the introduction to chapter 9.

3.6.1 Infant School children

The lack of systematic research is more pronounced in preschool and infant school children, in part because of difficulties administering questionnaires and completing semi-structured interviews with young children. Measurement issues specific to younger children are discussed in chapter 11. A new measure of PTSD for infant school children, The Early Childhood Trauma Self-Report is the topic of chapter 13.

Most knowledge of PTSD in this age group is from expert opinion of experienced clinicians. Young, preverbal children communicate distress by behavioural change temporally linked to a given trauma. General signs include alterations in the ease of feeding, sleeping or generally settling the child. Regressed behaviour may be noted and may include the child's unwillingness to explore the environment, increased stranger danger, increased aggression or clingy behaviour.

Verbal preschool children may display or voice broad emotions such as anger, sadness and excitement. Mixed or rapidly changing states are frequent. Separation anxiety is common, so too are specific trauma-related fears. Post traumatic play, in

Terr's terminology 're-enactments' given the absence of the fun element of play, is typical (Terr, 1994). Re-enactments are compulsive, repetitive behavioural sequences that are unconsciously linked to the traumatic event. Non-traumatised children can be involved in a traumatised child's re-enactment. This involvement can place children in danger (Terr, 1994) for example, setting or playing with fire following a bushfire disaster.

3.6.2 Primary and High School children

With increasing age, symptomatology is more typical of adult PTSD. Age related phenomena still exist such as aggressive or withdrawn behaviour, however, behaviour becomes more sophisticated. Fear of death, separation anxiety or fear of the event recurring, are common. Magical thinking and ascribing omen status to events before the trauma, variously termed 'omen formation' (Terr, 1979) or 'cognitive reappraisal' (Pynoos, 1989), is common, so too phenomena such as nightmares and sleep disturbance. Flashbacks are reported, however, the visual images and sounds reported by Pynoos and Eth (1986) have a more daydream quality than the sudden, intrusive adult phenomena. Symbolic associations do occur. Yule reported a fear generalisation gradient in the adolescent survivors of a shipping disaster. In this group, stimuli approaching the traumatic event evoked increasing distress. For example some adolescents were distressed by any reference to water, such as water running from a tap (Yule, Udwin, & Murdoch, 1990; Yule, 1992).

Denial and disavowal of the traumatic event, except with trauma secondary to chronic sexual or physical abuse where coercion and secrecy are common, is not often seen in childhood PTSD presentations. However, children do often withhold the extent of their distressing experiences from their parents. Either because of perceived difficulties talking to their parents following trauma (Stallard & Law, 1993) or as reported by Yule (1991) after shipping disasters the children specifically did not want to make their parents more anxious by the added burden of their feelings of distress. Another distinction from adult PTSD is that numbing and restriction of affect is not frequently reported by children, in part because of the difficulty in younger children understanding these concepts.

Time may diminish the emotional impact and symptoms of PTSD. Possible mechanisms include habituation to the reminders of a given event and a process of more normative forgetting. However, symptom reduction may be misleading. A perception of mastery may in reality be diminished re-experiencing symptoms as a consequence of more emotional numbing and avoidance symptoms. Over time mastery of trauma related fears may occur with the re-establishment of non-trauma dependant schema. However, symptom chronicity is also well described. Persistent symptoms of PTSD were reported: by children and adolescents 5-9 months after a shipping disaster (Yule, 1992), 1 year after a sniper attack on a school (Nader, Pynoos, Fairbanks, Frederick, 1990), 26 months after bushfires (McFarlane, 1987), and 10 years after surviving the 'killing fields' of Cambodia (Kinzie, Sack, Angell, Manson, Rath, 1986). Two other time related symptoms are notable. Anniversary reactions may increase over time and often their occurrence is not immediately attributed to the traumatic event (Terr, 1994). Anniversary symptoms may include any symptom in the PTSD spectrum. 'Future foreshortening' was reported in 23 of 25 Chowchilla children and included the view that their lives would not be full, long and their career or marriage successful (Terr, 1983).

Few child-adolescent differences in psychopathology or other disaster related constructs could be described at the outset of this research. Often disasters effected small numbers of children, samples that were not representative of the developmental range. Larger scale disasters may lead to greater numbers of traumatised children, however, are very challenging research environments. Chapter 5 highlights that understanding developmental stage differences in trauma related psychopathology was one aim of this research.

3.7 Outcomes

Consistent with the developmental model, post-disaster impairment may be in the social, family, school and individual domains (Pynoos, Steinberg, Wraith, 1995). Few studies have considered outcomes other than syndrome and symptom persistence and the development of secondary co-morbidity.

There are factors specific to disaster research that helps to explain the lack of outcome studies. The typical post-disaster community and government emphasises is on

restoring physical integrity, therefore treating the injured. This is followed by restoration of shelter and ensuring there is adequate food and sanitation. Chapter 4 will describe the difficult task of encouraging a community to embrace a post-disaster psychological intervention. The community dynamic seems to be an early phase of willingness to embrace such forms of care followed by a later community withdrawal with an increasing emphasis on self-sufficiency and a degree of suspiciousness about the agendas of some 'outsiders' including health professionals. To return to this environment 1, 2 or 5 years later and wish to discuss persisting emotional responses to the disaster is often seen as unwanted.

There are also ethical and pragmatic difficulties to outcomes studies of disaster samples. The ethical issue is of potentially re-traumatising individuals who perceived they have dealt with their feelings and have 'moved on'. Funding for follow-up studies is a pragmatic difficulty given that major grant bodies placed disaster research at a lower priority than other research areas. This is at a time when the money available for interventions in the post-disaster phase, often generously given by government and public donation, is no longer available.

Medium term outcome studies, defined as 1 to 5 years post-disaster have demonstrated symptom chronicity. Few long term outcome studies have been undertaken. Green and colleagues (1994) conducted a 17 year follow-up of survivors of the Buffalo Creek mudslide disaster. Generalising from the Buffalo Creek findings is difficult given the original research sample included data obtained retrospectively from court reports prepared for victims. Further, the collected data was in a pre-DSM III diagnostic format. Original estimates of PTSD were 32% of children experienced 'probable' PTSD (Green, 1991). At 17 year follow-up the PTSD rate had decreased to 7% (Green, Grace, Vary, Kramer, Gleser, Goldine & Leonard, 1994). More remaining PTSD sufferers were woman. There was no differences in participant age. The only symptoms that increased over time were substance abuse and suicidality (Green, Grace, Vary, Kramer, et al., 1994; Korol, Kramer, Grace & Green, 2002).

CHAPTER 4

BUSHFIRE DISASTERS AND THE ORIGINS OF THE SUTHERLAND BUSHFIRE TRAUMA PROJECT

4.1 Bushfires in the Australian context

Wildfires may affect all types of vegetation and are probably part of all ecosystems, especially if there is an abundant supply of dry fuel and a source of ignition (Martin, 1996). Geological evidence suggests large wildfires have occurred in Australia since the Late Devonian period (Nichols & Jones, 1992). Lightning strikes during electrical storms are the most frequent cause of fire ignition (Scott, 1989) accounting for up to 80% of recent fires in the Australian state of Queensland are ignited by lightning strikes (Luke & McArthur, 1978). Aboriginal use of fire is also important in the Australian context. Aboriginal people used fire for multiple uses including decreasing vegetation, especially undergrowth and to increase grasslands. Increased aboriginal use of fire may have occurred around 4000 years ago during the period of 'Intensification' (Lourandos & Ross, 1994). One consequence of the widespread cessation of aboriginal burning practices may be the increase in forest fuel load, leading to an increased possibility of large wildfires.

Arson is an important contemporary cause of bushfires. The prevalence is difficult to quantify, however, every fire season probable incidents of arson are recorded.

Large, destructive wildfires are common in the present Australian environment. In the state of New South Wales, since detailed recording in 1957, bushfires that have caused loss of human life have occurred in 1965, 1969, 1980, 1985, 1992, 1994

and 2003. Fire size and the damage caused vary greatly. The largest fires during this reporting period burnt 1,117,000 hectares of land. Given that such large conflagrations occur in rural and regional areas, stock losses are often high, while property loss is less extensive. In the wider Australian context all Australian states are prone to summer bushfires. In terms of loss of life, the most serious thus far, was the 'Ash Wednesday' fire affecting South Australia and Victoria (1983) in which 28 lives were lost on one day (McFarlane & Raphael, 1984).

4.2 The January 1994 New South Wales Bushfire Disaster

The summer bushfire 'season' of 1993/1994 was one of the worst on record. A potential bushfire disaster around the outskirts of Sydney was made possible by a prolonged spell of hot, dry weather combined with bushland and native forest abundant with fuel which had gathered over the preceding years. During the period December 27th 1993 to January 16, 1994 more than 800 separate bushfires were reported. After the New Year, the fires increased in size and linked together as hot dry winds fanned them. Fires burnt in native and semi-rural locations around Sydney as well as two major suburban areas: the Sutherland Shire in the southern Sydney suburbs and the Lane Cove area near a major National Park. Unlike other natural disasters that can be extremely sudden paroxysmal events, the 1993/4 bushfire disaster lasted 20 days. Details of the fires were seen or heard on hourly radio and television updates and were the major item on nightly news bulletins. The proximity of the fires to metropolitan Sydney (population 4 million) meant smoke and ash affected much of the city. In the evening fires in the elevated southern hills were clearly visible.

On January 6 and 7 the situation became critical. During this period several fires burnt out substantial bushland and houses on Sydney's north shore and the peninsula area. Major fires also burned in the Blue Mountains and the Central Coast, threatening several towns. In the Sutherland Shire the most concentrated damage occurred. Many suburbs such as Grays' Point, Waterfall and Alford's Point had been threatened by fire for many days. These suburbs were situated on the southern bank of the Georges River. Houses were often built on small river flats, in narrow sandstone gullies or on sandstone escarpments. Single or double storey free standing dwellings were typical, built of either wood or brick. Often houses were designed to

blend with local flora and indeed the area was known for the abundance of native forest. There was no high density housing or mobile home estates and caravan parks in the affected area. High density housing is important when considering the potential for infrastructure damage caused by a disaster. In many areas road access was difficult given the steep escarpments and deep valleys. Following the bushfire disaster the lack of access for emergency vehicles became an important issue for analysis. Further, there was much speculation concerning building practices and landscape design and the implications of these factors on the subsequent loss of houses during the disaster.

On Saturday January 8 major fires, fanned by strong winds, swung through this area. On this day alone approximately 100 houses were destroyed.

In total in the state of New South Wales 800,000 hectares of land was burnt during this period and 206 houses were destroyed. A state of emergency was declared in NSW and 20,000 fire-fighters, including voluntary brigades from all Australian states assisted in the combating the fires. It remains miraculous that only 4 lives were lost.

4.3 The Origin of the Sutherland Bushfire Trauma Project

The Australia schools re-open in the last week of January following a six week summer vacation. At the start of the 1994 school year students in the Sutherland Shire had to traverse extensive tracts of blackened land, often with evidence of physical fire damage to reach their respective schools. Early in the school year, teachers, school psychologists (known in Australia as school counsellors), and principals expressed concern about the psychological well-being of their pupils. Mental health professionals provided anecdotes of children appearing more anxious. There was an increase in separation difficulties amongst younger children, and children were unwilling to play outside during lunch and recess periods. Teachers complained that students talked excessively about the bushfire disaster.

These stories, told to Sutherland Shire mental health professionals with some knowledge of the child trauma literature, presented an illustration of Benedek's period of 'alarm' (Benedek, 1985). In the Sutherland Shire there was a gathering of

anecdotal, experiential and descriptive data that suggested a significant number of children and adolescents were experiencing post-traumatic mental health issues.

In response to the New South Wales' Department of School Education personnel's feelings of alarm an inter-departmental group of mental health, educational, non-government mental health and pastoral practitioners was convened to develop a response to the greatest disaster this area had experienced in living memory. The meeting was chaired by the Director of the School Psychology Services. The author was a representative of the Department of Child and Adolescent Psychiatry at a regional pediatric teaching hospital. The aim of the group was to provide a coordinated and effective response to children and adolescents in this area with post-disaster emotional distress or other post-disaster psychopathology.

The working group quickly identified a series of issues:

- The likely number of children who may benefit from a post-disaster mental health intervention was unknown.
- There were few existing mental health resources. Government mental health resources in this area consisted of one community Child and Adolescent Mental Health Service (CAMHS) comprising 6.0 full-time clinical staff and Department of School Education School Psychologists.
- Existing mental services had substantial workloads with little capacity to absorb the greater workload created by the disaster.
- There was no track record in the area of inter-sectoral cooperation.
- There was no expertise on providing a post-disaster mental health intervention to a large group of individuals.

The inter-sectoral working group were immediately faced with a serious predicament, probably inherent to all post-disaster situations. Unexpectedly a disaster had occurred in their geographical area of responsibility. What usually happened "to other people", had happened to members of this group. The service provision context was that public services, whether education, welfare, disabilities or health were already operating at full capacity – see chapter 1 of this thesis: 'Overview and Importance of Child and Adolescent Mental Health'.

The child mental health service provider could not absorb the increased demand for counselling services. Further, it could be argued that whilst this sector had advanced generalist mental health treatment skills, it did not have specifically developed skills to treat post-disaster emotional problems. It did include a group of practitioners that could obtain such skills quickly.

Members of the working group predicted that, owing to the enormity of the disaster, many children would experience adverse psychological reactions. Hence the predicament: the probability of large numbers of distressed children, no obvious way of identifying these children, and the lack of capacity to provide treatment.

The author suggested that the inter-sectoral group lacked information about the post-disaster prevalence of PTSD among children and adolescents upon which estimates about service need could be based. Projections could be made based on data from other disasters – see chapter 3 of this thesis: ‘Overview of Post Traumatic Stress Disorder in Children and Adolescents’. These projections were limited by the relative paucity of studies of children and adolescents, and difficulties comparing disasters with greatly differing exposure and loss of life and property. Nevertheless, there remained a strong desire by group members to provide treatment for distressed children. The author of this report suggested screening children in a widespread, school based program.

4.4 Screening

Screening can be defined as the application of a test to a population sample (universal or specific) with the aim of the early identification of a condition or disease that is amenable to treatment. The screening procedure needs to be acceptable to the individual, be economically viable and lead to better health outcomes (Fletcher & Fletcher, 1988). Mental health screening is usually undertaken using self-report questionnaires. The SBTP screening procedure and important theoretical aspects of screening are discussed in chapter 5.

4.4.1 The Decision to Screen

Key stakeholders in the screening process were school principals, school psychologists, parents and the children and adolescents themselves. School principals in New South Wales have the delegation to determine which school based programs they will bring into their school. School psychologists are the primary mental health resource available to schools. Parents, who need to give informed consent to allow their children to participate in the screening procedure and consider the possibility that their children will be identified as experiencing post-disaster emotional distress. Different issues existed for each group.

School psychologists were a central group; they were the major advisors to principals on child and adolescent mental health issues and were also the assessment and treatment resource accessed by teachers and parents. School psychologists had a substantial existing workload comprising educational and psychological assessments. They were aware of the potential for a significant increase in referrals. Possibly because of their familiarity with testing for intelligence and school based achievement school psychologists were supportive of screening.

Many Principals requested a briefing by the author, usually accompanied by the District Principal School Psychologist. Questions included duty of care issues, the likelihood of screening leading on to an acceptable treatment, whether this procedure had been trialled elsewhere and pragmatic administrative issues such as the demands on school staff and time. Some principals did not request a meeting and relied on the advice of the school psychologist. Only one principal declined both a meeting and the possibility of screening occurring in his school.

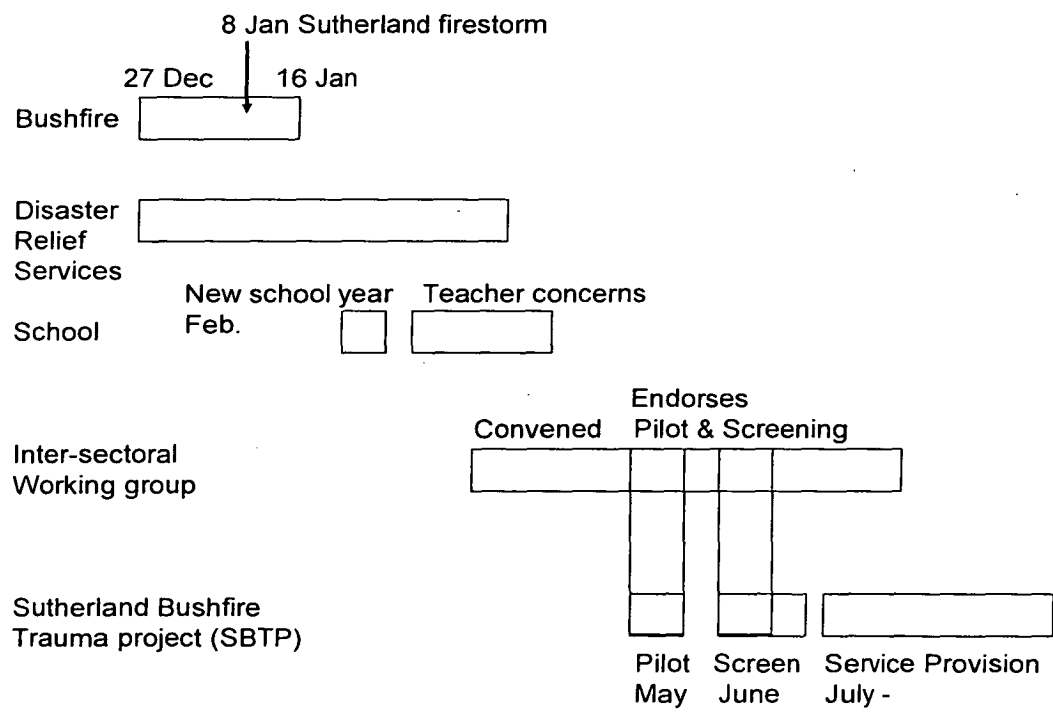
Every school held a parent information evening. It was clear from these meetings that parents were concerned about the possible distress and anxiety of their children. Few parents were negative about screening, case identification or the proactive nature of the project. Parents with reservations were comforted by the informed consent procedure. Ethical issues including consent are discussed in chapter 5.

Across all groups a common theme was the potential that screening and a subsequent intervention may 'disturb' or 'stir up' children. In response it was cited that contemporary knowledge of emotional trauma therapy was that promoting silence and not talking probably aided emotional numbing and avoidance symptoms,

symptom chronicity in general and feelings of suffering alone and in isolation (Herman, 1997).

The inter-sectoral group adopted the screening proposal in principle pending further information. At a second meeting, the screening instruments were described and plans for a pilot study were developed. The author was appointed as the overall project manager. A steering committee was convened and met monthly throughout the duration of the project. Inter-sectoral cooperation was a notable feature of this endeavour. Figure 4.2: Timeline of the Bushfire Disaster and subsequent SBTP Activities depicts the time after the bushfire as a function of school teacher concerns, the convening of the steering committee, the pilot phase and service delivery phase of the project.

Figure 4.2
Timeline of the Bushfire Disaster and subsequent SBTP Activities



4.3.2 Designation of ‘At-risk’ Schools

The original inter-sectoral stakeholder group suggested 19 primary schools and 3 high schools considered “at risk” of having distressed children and adolescents. Schools were considered “at risk” if:

- there was direct damage to the school by the bushfire eg school buildings destroyed
- The bushfire was in such proximity to the school that nearby structures were damaged. This included several schools where the fire was stopped at the school fence.
- extensive areas of blackened, fire affected land had to be passed to get to school
- the school included students whose homes had been destroyed by the fire

The following chapter of this thesis will detail the aim, hypotheses, research design and methods of the SBTP.

4.5 Summary

This chapter briefly details the natural history of bushfires within Australia. Information is provided on the regularity of Australian bushfire disasters, and the bushfire disaster central to this thesis is described. The inter-sectoral, child and adolescent, school-based mental health response following the bushfire disaster is described including details of the process that lead to the project, the roles of key groups of individuals and the decision process to trial universal screening for emotional distress and depression.

CHAPTER 5

SUTHERLAND BUSHFIRE

TRAUMA PROJECT:

AIMS AND HYPOTHESES

5.0 Summary

This chapter details the aims of the Sutherland Bushfire Trauma Project (SBTP) and specific hypotheses relating to post-disaster emotional distress and depression.

5.1 Aims

The SBTP included aims in the areas of (1) characterising children and adolescents who witness a bushfire disaster, (2) report psychopathology, specifically emotional distress and depression in children and adolescents after the bushfire disaster, (3) investigate the relationship between factors inherent to the individual and factors inherent to the bushfire disaster and their relationship to child and adolescent post-disaster psychopathology, (4) assess whether large-scale screening for such psychopathology was a viable option in the post-disaster environment, (5) whether mental health service provision could be better informed by the screening process, and (6) the child, parent and counsellor satisfaction with a of a guided therapy workbook as a post-disaster psychological intervention for children.

In more detail:

(1) Characterising children and adolescents who witness a bushfire disaster:

The aim was to describe children and adolescents who witnessed the bushfire including their age, gender, school grade and socio-demographic factors. Further, to describe the typical bushfire experience in a child and adolescent sample including fire exposure, evacuation experience, separation experience from parents, home damage or destruction and the child's views on their threat of dying during the disaster or the potential death of their parent(s).

(2) Report psychopathology, specifically emotional distress and depression in children and adolescents after the bushfire disaster.

There was face validity to the proposition that children and adolescents experiencing distressing events and or loss would most likely experience emotional distress and PTSD symptoms, and depression following the disaster. Prior to the SBTP child report of these symptoms had not been published.

(3) Investigate the relationship between factors inherent to the individual and factors inherent to the bushfire disaster and their relationship to child and adolescent post-disaster psychopathology,

An aim was to collect data both about the individual's experience of the bushfire disaster and individual factors. An aim was to subsequently investigate the relationship between these factors, and their relationship to post-disaster emotional distress and depressive symptoms.

(4) Assess whether school based large-scale screening for such psychopathology was a viable option in the post-disaster environment and

A universal approach to child and adolescent mental health issues includes the central role of the school as the major point where children and adolescents regularly attend and interact. An SBTP aim was whether the school environment was also suitable to conduct wide-spread screening of children and adolescents for post-disaster mental health symptoms.

(5) Whether mental health service provision could be better informed by the screening process.

An SBTP aim was to determine if school based screening included more parents, children and adolescents in a purposeful, thoughtful process of consideration of the mental health implications of a bushfire disaster. Further, whether the process led to increased identification of children and adolescents who may benefit from a post-disaster psychological intervention.

(6) Child, parent and counsellor satisfaction with a of a guided therapy workbook as a post-disaster psychological intervention for children.

An SBTP aim was to use a guided therapy workbook as a psychological intervention for the potentially large number of children identified by screening. Further, to assess the child, parent and counsellor perception of and satisfaction with this form of mental health service provision.

5.2 Specific Hypotheses

5.2.1 Hypotheses relating to Emotional Distress

1. Approximately 10% of the study population will report levels of emotional distress above accepted cut-off criteria for abnormality on a self-report measure 6 months after the bushfire disaster.
2. Females will report a statistically significant higher mean emotional distress score.
3. Younger children will report a statistically significant higher mean emotional distress score.

4. The characteristics of an individuals' bushfire experience will be related to the individual's level of emotional distress. For children in the bushfire-exposed group:

(a) Children exposed to the fire will have a statistically significant higher mean emotional distress score.

(b) Children separated from parents on the day of the fire will have a statistically significant higher mean emotional distress score.

(c) Children evacuated on the day of the fire will have a statistically significant higher mean emotional distress score.

5. The individual's appraisal of the threat of the event will be related to the individual's level of emotional distress such that:

(a) Children who perceived they may have died during the event will have a statistically significant higher mean emotional distress score.

(b) Children who perceived their parents may have died during the event will have a statistically significant higher mean emotional distress score.

6. Individual's who's homes were damaged or destroyed will have a statistically significant higher mean emotional distress scores.

5.2.2 Hypotheses relating to Depression

Are similar to hypotheses relating to emotional distress, such that:

1. Approximately 10% of the study population will report levels of depression above accepted cut-off criteria

2 Females, (3) younger children and (4) children experiencing loss during the bushfire disaster will report a statistically significant higher mean depression score.

5. Children with higher mean depression scores will report statistically significant higher emotional distress scores.

5.2.3 Hypotheses relating to special groups: Infant students

5.2.3(a) Infant Self-report

1. Infant school students (grade 1, 2, 3) will be able to indicate persisting emotional distress concerning the bushfires by answering simple yes/no questions.

2. The characteristics of the individuals' bushfire experience will be related to the individual's level of emotional distress: (a) Infant school children exposed to the fire, (b) separated from their parents and (c) evacuated on the day of the fire will have a statistically significant higher mean emotional distress score.

3. The individual's appraisal of the threat of the event will be related to the individual's level of emotional distress such that Infant school children who perceived (a) they may have died or (b) their parents may have died during the event will have a statistically significant higher mean emotional distress score.

4. Infant school children who's homes were damaged or destroyed will have a statistically significant higher mean emotional distress scores.

5.2.3(b) Parent-report of infant symptoms

- 1 Parents will statistically significantly report more externalizing symptoms, for example behaviour change and nightmares.

2. There will be a statistically significant higher mean parent-report symptom count for girls.

3. There will not be a statistically significant higher mean parent-report symptom count by age or between school grades

There will not be a statistically significant concordance between (4) similar items on the parent-report child symptom checklist and the child-report

Kelly questionnaire or (5) the total symptom count on the parent-report child symptom checklist and the total score of the child-report Kelly questionnaire.

6. There will not be a statistically significant higher parent-report child symptom checklist item scores in children who experienced bushfire related evacuation or separation or (7) who experienced bushfire related perception of threat to themselves or their parents or (8) who experienced bushfire related evacuation, separation or higher perception of threat.

5.2.4 Hypotheses relating to special groups: the children of Volunteer fire-fighters

1. The children of volunteer fire fighters will report lower mean emotional distress scores compared to children who do not have parents who are volunteer firefighters.

2. The children of volunteer fire fighters will report higher mean depression scores compared to children who do not have parents who are volunteer firefighters.

3. If the children of volunteer fire fighters report depressive or emotional distress symptoms, these symptoms will have a similar relationship to bushfire-related variables and individual factors (age, gender, trait anxiety) compared to children who do not have parents who are volunteer firefighters.

5.2.5 Hypotheses relating to service provision

1. The child's school will be an appropriate setting to conduct wide-spread post-disaster screening for emotional distress and depression.

(2) More than 70% of parents and (3) more than 70% of children and adolescents will find the screening process acceptable.

4. More children and adolescents will be offered a post-disaster psychological intervention following identification by screening than occurred during the six months prior to screening.

5. More than 70% of children and parents and (6) school counsellors and child and youth mental health staff will be satisfied with the guided therapy workbook as a post-disaster psychological intervention for children identified by screening.

7. More than 70% of adolescents and (8) school counsellors and child and youth mental health staff will be satisfied with a group program as a post-disaster psychological intervention for adolescents identified by screening.

CHAPTER 6

SUTHERLAND BUSHFIRE

TRAUMA PROJECT:

STUDY DESIGN AND METHOD

6.0 Summary

The method section begins with the overall research design including the sampling method. The school-based screening pilot is discussed for infant school, primary and secondary school children. The study subjects are described, however, more detailed analysis of the study sample is found in Chapter 7. This is followed by a discussion of the psychometrics of the three major scales employed: The Impact of Event Scale (Horowitz, Wilner & Alvarez, 1979), the Birleson Depression Self-Rating Scale (Birleson, 1981) and The Revised Manifest Anxiety Scale (Richmond & Reynolds, 1987). Ethical considerations of the SBTP and in specific the ethics of wide-spread school screening are then discussed. The chapter concludes with an overview of the statistical analysis employed.

6.1 Method

6.1.1 Research design overview

The SBTP has many features of an epidemiological study. Such features include the use of a human population to study the relationship of exposure to a potentially life-threatening event and subsequent emotional distress and depressive psychopathology and a large sample size of unselected subjects, other than attendance at public schooling and parent consent to participate. The study was empirical, featuring systematic collection of observations of child and adolescent psychopathology and disaster-related events leading to quantification and subsequent variable analysis. Of possible epidemiological designs, the SBTP was a cross-sectional study.

6.1.2 Sampling Method

Given the overall service provision ethos of the SBTP, a whole population sampling frame of primary and secondary children was attempted. Therefore, the aim was to screen all children and provide an intervention to children identified as being emotionally distressed by the bushfire disaster. The perceived need for this strategy is discussed in detail in the ‘screening’ section in Chapter 4 of this thesis. In essence it was argued that without proactive screening there would be a significant group of children with an unmet need for a psychological intervention.

6.2 Procedure

6.2.1 Screening personnel:

Screening personnel were drawn from volunteers from Department of School Education school counsellors, Child and Adolescent Mental Health Service

(CAMHS) members from the only local Department of Health CAMHS team, Year 4 and 5 Clinical Masters students in Psychology from the University of New South Wales and therapeutic staff from the Sutherland Red Cross Disaster Relief Centre. All personnel were given a written protocol of the screening procedure and a brief training module to ensure presentation of the screening questionnaire was done in a reliable format. The procedure was reiterated prior to screening in each school. To further enhance procedure reliability, new staff were teamed with members who had already been involved in screening several schools. Considerable expertise was generated by the procedure, both the author of this thesis and Janet Cross, the head of school counselling services in the bushfire area were involved in screening more than 15 schools.

6.2.2 School participation

A project member, (the “at risk” school cluster District Guidance Officer) contacted principals by telephone and explained the rationale of the project. It was emphasised that the identification of students with persisting post-bushfire emotional distress and the subsequent provision of an intervention to the identified group was the primary objective of screening. It was also discussed that research, integrated with the service provision ethos was seen as essential and this approach of integrated service evaluation was consistent with the Australian National Mental Health Plan. Verbal consent was obtained from all but 3 school principals. One high school had recently suffered the death of its principal through illness and the death of a recent student who was an innocent bystander at an armed robbery. The acting principal felt that given this heightened context of grief experienced by school teachers and pupils, the school could not accommodate the project. By the time the majority of schools were being screened, the acting school principal had reconsidered and agreed to participate. Two primary schools declined to participate. One principal gave no reason for the decision. The other gave the opinion that there were ‘no emotionally distressed children’ in that school and therefore the SBTP was not relevant for them.

6.2.3 Pilot study: Aims and Overview

Two schools participated in the pilot study (schools A1 and B1). A1 was a primary school, designated as having a moderate fire exposure. A1 had some evidence of blackened trees and burned vegetation 200 meters from the school, many of the school children were evacuated from their homes during the bushfires and several children had their homes damaged. B1 was a high school with moderate to severe exposure. The fire perimeter was across the road from the school, fire damage was clearly visible from the school and many students' homes were damaged. The pilot study was conducted 3 months after the fire. The main screening effort was planned for 5 - 6 months after the fire.

The aim of the pilot study was: (1) to trial the screening battery suggested by an international expert (W Yule, Institute of Psychiatry, London) with Australian high school children. (2) To trial the same battery in grade 4, 5 and 6 students – an age group not covered in Yule's post shipping disaster study (Yule, 1991). (3) To trial self-report questions in younger children, grade 1, 2 and 3 children. (4) To trial the usefulness of using children's drawings to identify children who were still effected by their bushfire experience.

The pilot study also had an important function to test the logistics of large scale school based screening. Principle issues prior to a rollout of extensive school-based screening included: (1) assessing the number of and experience required by the screening personnel and (2) investigating the process required, including requisite principal, teacher and parent information, communication and consent for the screening procedure. In the pilot screen questionnaires were administered to 500 children.

6.2.4 Pilot Study: Screening of Infant School (grade 1, 2, 3) children

As with screening children from other developmental stages, screening children in grades 1, 2, 3 was standardised between classes and protocol driven. Screening occurred in the child's regular classroom, using materials available in that room. The grade 1, 2, 3 screening protocol required 40 minutes, needed 2 screening personnel to answer children's questions and the class teacher to remain in the room

to assist with keeping the class on task. Tables and chairs, and drawing equipment were required.

With a general caveat that teachers, teaching aides and screening personnel were specifically asked not to mention that the activities of the day were about bushfires, children in this age group completed 3 exercises. (1) On a standard A4 form the children were given 10 minutes to draw a picture, “about anything you like”. No other instructions were given. (2) The children were given 10 minutes to, “draw a dream”. Clarifying statements, “either a good dream or a bad dream”, “or a dream that you have had recently” were allowed. The final activity, (3) was to answer questions concerning post disaster distress by ticking either a YES box, or a NO box in response to 20 questions read out by one of the screening staff.

Prior to the screening pilot it was considered a possibility that some young children may be distressed by the reminders of the bushfire disaster posed in a questionnaire. Further, the working group had no prior knowledge of this questionnaire battery or any other being used with young children (age 6-8 years) after a natural disaster. It was the opinion of teachers and school psychologists that questions with three and four optional response fields were too advanced for infant school children. However, parent feedback strongly favoured including younger children in the screening process. The inter-sectoral working group agreed upon a strategy that was close to, yet hopefully would not directly evoke strong post-disaster re-experiencing or other distressing phenomena. The agreed upon methodology was a brief vignette of an individual that sees a fire in the distance and the accompanying picture to that effect. YES/NO questions were asked about the responses of the child in the picture, not about the child’s own experience. On completion of the screening tasks children were asked if they wished to say anything concerning the bushfires. This is discussed in greater detail in chapter 6 of this thesis.

6.2.5 Screening Primary school pupils (grade 4, 5, and 6):

Primary school children completed a battery of 3 questionnaires (see ‘measures’ below). Questionnaires were completed in the child’s regular classroom. Whilst delivery was a group activity, answers were individual and not shared with other class members and speaking during the screening was discouraged. The child’s

teacher was present. Screening was supervised by one of the SBTP screening personnel. All questions on the screening battery had 2 or more response fields. Prior to completion of the questionnaires children were involved in a brief, 5 minute training module where it was demonstrated with neutral questions, for instance, 'Do you usually have breakfast before school?', how to answer a questionnaire with multiple response answer fields.

To remove literacy as a major confounder all questionnaires were read aloud in a slow modulated way. Following reading the item, all answer fields were also read aloud, e.g. "some of the time", "all of the time". Questionnaire 2 and 3 were commenced after all children indicated they had completed the previous questionnaire. Students completed the screening module in 30 – 35 minutes.

6.2.6 Screening Junior & Senior high school pupils (grade 7-12):

High school students were given the questionnaires in classes as per older primary students; however, the questions were not read out aloud. Students at this age completed the task in 20 minutes. The presence of the class teacher and one screening staff member was required: to complete the brief training module for answering multi-response field questions, to answer any enquires that arose whilst individuals completed the questionnaires and to keep students on task.

6.3 Subjects

6.3.1 The Study Sample

The study sample is discussed in detail in Chapter 6. In brief, the study population included all children attending designated New South Wales Department of School Education (therefore publicly funded) schools from grade 1 to 12. Grade 12 is the final year of secondary schooling in Australia. School inclusion designation has previously been discussed in this chapter. The study sample included all children for whom informed consent was obtained to participate in the study.

The Ethics Committee did not give approval for a lengthy, detailed data collection protocol, especially given the SBTP aim to screen and hence use brief and easily applied measures. Indeed the only non-screening questionnaire data that was allowed was disaster-related questions that could be placed on the reverse side of an A4 consent form. See 'Ethics' section latter in this chapter. Socio-demographic data that is available is from the Australian Bureau of Statistics 1991 and 1997 Census of the SBTP geographical area.

The socio-demographics of the bushfire disaster area include: 81% of residents were Australian born and only 0.03% were Australian aboriginal or Torres Strait Islanders. The majority of non-Australian born residents emigrated from an English speaking country and comprised 8.8% of the total population of this area. Immigrants from a non-English speaking European country or Asia comprised 3.3% and 1.7% of the area's population. There were relatively few single parent households (10.4%). The area is considered 'middle class', consistent with 46% of residents having obtained some post-school qualification and a median annual household income of \$AUS 40-50,000 [Australian Bureau of Statistics, 1997].

6.3.2 Inclusion and Exclusion Criteria

The screen of Primary School children attempted to include all children with informed consent who, in the estimation of parents and teachers had the auditory, English language and intellectual capacity to hear the screening instruments read by a class teacher, understand the questions and record an answer by placing a tick on a scoring sheet. High School students needed to read as well as understand the questions and make an appropriate response on a scoring sheet. For both Primary and High School children a staff member was available to assist with literacy and scoring the form.

Whilst no school in the screened area was either a school specifically for intellectually impaired children or had an intellectually impaired program in the school curriculum, there were some mainstreamed children of limited intellectual capacity in the screened schools. Anecdotal evidence from school counsellors was that these children were usually not screened. However, given the school staff and

parent awareness of the vulnerability of these children, they often received increased counselling and support services following the disaster.

6.4 Measures of Mental Health Morbidity

The aim of measuring the mental health morbidity of SBTP subjects was to communicate the number of effected individuals in the sample being studied and from this information make an informed view of the likely number of effected individuals in the population as a whole. Briefly detailed below are important definitions related to morbidity.

The rate of mental health morbidity is the number affected in the study sample divided by the total number (effected and non-effected) in the study sample. The point prevalence of emotional distress is the number of individuals distressed at a given point in time. Point prevalence is useful if the entity being measured does not experience marked day to day fluctuations. Symptoms of emotional distress, if they cause impairment in some domain, by definition are enduring and not fleeting. This is codified in diagnostic schema that includes a minimum symptom frequency and a time cut-off point for inclusion into a diagnostic category. DSM IV is one such classification.

The incidence of a condition is the number of previously healthy individuals that develop the condition over a period of time, usually one year. It is assumed that few individuals in the target area prior to the bushfire disaster experienced emotional distress symptoms related to a bushfire. Whilst in some areas of Australia this assumption would not be sustainable, given the Sutherland area had not experienced a past bushfire disaster or a major bushfire of any description in 'living memory' it is likely the assumption is valid. In the SBTP post-bushfire psychiatric morbidity was assayed 6 months after exposure to the bushfire, in this scenario the point prevalence at 6 months is likely to be in the order of magnitude of the incidence of the condition. Although the point prevalence will be an under-estimate given if PTSD occurs following a traumatic event, most cases will develop soon after the event with onset after 6 months is uncommon; see Chapter 3 of this thesis. Further, some individuals with mild self-limiting conditions may have been symptomatic at 1 month post

disaster, thus fulfilling the time criteria for PTSD and yet their condition resolved by the time of the 6 month screening.

This study employed a screening battery to assess psychiatric morbidity in the domains of emotional distress and depression. The former measured by the Impact of Event Scale (IES: Horowitz & Alvarez, 1979), the latter by the Birleson Depression Self-Rating Scale (DSRS: Birleson, 1981). A measure of anxiety was included in the battery, the Revised Children's Manifest Anxiety Scale (RCMAS: Richmond & Reynolds, 1987). Its use was as a measure of trait anxiety. It was not included to measure a post-disaster anxiety state.

It is a general design issue that in many post disaster research projects the timeline for clarification of design and deciding upon suitable measures is seriously curtailed. In the SBTP the working group wanted the candidate of this thesis to have preferred instruments available one week after the inaugural meeting. The group considered this timeline realistic given the perceived more lengthy Ethics Committee approval process time and the time required to obtain parent and school principals' approval and consent.

This very brief timeline for measurement issues was overcome by (1) direct communication with an expert in the child and adolescent mental health disaster research field, Professor William Yule (Institute of Psychiatry, London). Professor Yule used the battery agreed upon for the SBTP in studies of adolescent survivors of a shipping disaster (Yule, Udwin. 1991). Professor Yule advised Professor Einfeld, who then communicated his opinion to the author of this thesis, that the battery would also be useful after a bushfire disaster. Questions in two of the three measures would require no rewording. The third measure, the Impact of Event Scale was designed to allow insertion of the name of type of disaster event. (2) Theoretical considerations and existing literature providing evidence that PTSD psychopathology was the most likely post-disaster psychopathology to be experienced by survivors of a disaster that involved exposure to a potentially life threatening event. This is discussed in more detail in chapter 3 of this thesis. (3) Theoretical considerations and existing literature that experiences of loss are central to the disaster experience. Loss and grief experiences may manifest as depressive psychopathology or be a causal factor in the development of a depressive syndrome.

6.4.1 The Impact of Event Scale (IES)

The Impact of the Event-Scale (IES) (Horowitz, Wilner & Alvarez, 1979) is derived from Horowitz's stress response theory (1976). The IES is a self-report measure with 15 questions each with 4 response fields and is scored not at all (0), rarely (1), sometimes (3), often (5). Each question is anchored to the stressful event of interest by including the event name in the given question. For example, "I had dreams about the bushfire" or "I tried not to talk about the bushfire". Scores generated include a total score and subscales: a 7 item intrusion scale and an 8 item avoidance scale.

Considering the reliability of the IES, a meta-analysis of the internal consistency of the IES is reported by Sundin & Horowitz (2002). They report 18 studies of adults of both genders who experienced a wide range of traumatic events from bereavements, natural disasters, exposure to violence and others. For the intrusion sub-scale the reported mean alpha equalled 0.86, range 0.72-0.92; for the avoidance sub-scale the mean alpha was 0.82, range 0.65-0.90 (Sundin & Horowitz, 2002). These results are above the 0.80 criteria of Carmines & Zeller (1979) and are concluded to be suitable for research use. Table 5.1 summaries the internal consistency of the IES for the SBTP sample. For the complete grade 4 - 12 sample the Cronbach alpha at 0.92 meets reliability criteria for a research instrument. The internal consistency is also suitable for the Primary school, Junior (grade 7 -9) and Senior (grade 10 – 12) High school groups at 0.86, 0.91 and 0.92 respectively. Note the internal consistency of the two High School groups is calculated on the full, 15 question IES scale, and the younger group on the 13 question version.

Several papers have reported on the IES stability by measuring test re-test reliability. The original IES report of Horowitz and colleagues cited a test re-test reliability of 0.87 and 0.79 for the IES sub-scales. Subsequent studies across both a brief (Weiss & Marmar, 1997) test-retest and prolonged (Solomon & Kleinhaus, 1988) test-retest periods suggest suitable test re-test reliability of the IES.

Table 6.1
The Internal Consistency of Measures used in the SBTP

	<u>Cronbach Alpha</u>			
	<u>Total</u>	<u>Grade 4-6</u>	<u>Grade 7-9</u>	<u>Grade 10-12</u>
Impact of Event Scale	0.92	0.86	0.91	0.92
Depression Scale	0.88	0.81	0.86	0.93
Anxiety Scale	0.94	0.92	0.96	0.88

Considering validity, the IES was developed from clinical observations of typical patients symptomatic responses to a traumatic event, Horowitz’s conceptualization of these events falling into two system clusters and the relationship between the system clusters. Horowitz concluded that avoidant symptoms exerted a homeostatic promoting control function to counter the more obviously distressing intrusive phenomenology (Horowitz 76). The latter concept is clearly formative of later conceptualizations such as Herman’s “dialectic” between PTSD cluster B (re-experiencing) and cluster C (emotional avoidance and numbing) symptoms (Herman, 94).

The review of Sundin & Horowitz reported that 10 of 12 studies reviewed replicated the original two factor subscales: avoidance and intrusion (2002). Sundin and Horowitz reported that 3 of these 10 studies (Joseph et al 1994; Foa et al 1995; McDonald et al 1997) reported a third factor, “emotional numbing” (2002). Several articles not reviewed by Sundin & Horowitz also cite a possible third factor. Shevlin and colleagues studying World War II and Korean military veterans found on a LISREL analysis the usual two factors, “with additional cross factor loadings for items 2 and 12” (Shevlin et al 2000). Larsson investigating witnesses of a mass murder found the usual two factors as well as a sleep disturbance factor (2000).

Few studies have reported the factor structure in children. Dyregrov and colleagues studied 1,787 children aged 5-15 exposed to the Bosnian war. The usual two IES factors were supported in the whole sample, and by age and gender. (Dyregrov et al 1996).

Sudin & Horowitz reported that 18 studies considered the convergent validity of the IES with 25 variables; including general measures of psychopathology, mood symptoms, stress symptoms, hormone levels and heart rate (see Sundin & Horowitz Table 3, 2002). These authors concluded the moderate correlations between other factors and IES sub-scales; with intrusion varying from 0.21-0.75, and with avoidance varying from no correlation to 0.71, suggested an independent contribution of information by the IES not provided by other scales and measures (Sundin & Horowitz 2002). This argument is supported by the convergent validity of the IES with other trauma instruments (Briere and Elliott 1998), with combat exposure (Hendricks et al 94) and the ability to separate traumatised from non-traumatised groups across a wide range of trauma exposure in adults and children (Briere 1997, page 131).

In summary, although the IES does not equate to a DSM IV conceptualization of PTSD, it is a psychometrically sound measure of trauma related stress symptoms and has been concluded by many authors (Sundin & Horowitz, 2002; Joseph et al 94) that it is a suitable measure for research of emotional distress symptoms. Possibly given the brevity of the IES its role, as suggested by Briere, may be specifically one of a screening instrument (1997).

In the analysis chapters of this thesis the term emotional distress is used as a general summary term for psychopathology measured by the IES. In the SBTP high school population the total school cut off recommended by Horowitz, greater or equal than 40 was used. Like the Dyregrov study of Bosnian children we found younger children experienced difficulty with two IES items. These were excluded and primary school children were administered an IES-13 scale. Again citing the work of Sundin & Horowitz it has not been unusual for researchers to use a modified version of the IES scale. Having excluded these two items and administered the IES-13 scale to primary school children a weighted cut off of 38 was used to define case versus non-case status.

6.4.2 The Birlson Depression Self-Rating Scale

The Birlson Depression Self Rating Scale (DSRS), not formally named by the author in the original study but subsequently regularly referred to as the DSRS, is an 18 item self-report measure of depression in children and adolescents. The instrument design followed a literature search and identification of 37 potential depressive symptoms in 7-13 year old children. Of the 37 candidate items, 18 items demonstrated the ability to differentiate depressed from non-depressed individuals from of 4 groups: child psychiatric clinic attendees with and without depression, attendees at a residential school for “maladjusted” children and a control group from a “normal” British school (Birlson, 1981). The 18 item final version is scored; most of the time (1), sometimes (2), and never (3). Different items are worded positively and negatively to account for a potential positive response bias.

The DSRS has undergone significantly fewer psychometric evaluations than the IES. Nevertheless, several studies have found the internal consistency suitable for research including the original study ($\alpha = 0.86$), and a study of child inpatients in the US ($\alpha = 0.73$, Asarnow & Carlson, 1985). Recent studies in Scandinavia found the DSRS has high internal consistency in an urban school sample (Ivarson & Gillberg, 1997) and when administered to adolescent psychiatry inpatients (Ivarson et al, 1994). The stability of the measure was found to be acceptable in the original study with a test re-test reliability of 0.80.

The construct validity of the DSRS is implied by the development of the measure with items generated by a review of the literature of childhood depression and selected items being able to differentiate a depressed versus a non-depressed group. It can be argued that it has less construct validity in adolescents over the age of 13 years. Good concurrent validity is suggested by the correlation between the DSRS and the Children’s Depression Inventory. The study of Ivarson & Gillberg also found high DSRS scores were significantly associated with female gender and suicide attempts, two factors known to be related to depression. Discriminate validity was inherent to the development of the instrument as reported in the original Birlson study (1981) and replicated in the work of Asarnow & Carlson (1985).

Few studies have reported on the factor structure of the DSRS. Birlson, in the original paper reported “one principle factor accounting for 30% of the variance” (1981). The more recent study of adolescents by Ivarson & Gillberg also reported

one factor (1997). Of interest Ivarson & Gillberg gave their opinion that the adolescents who self reported high DSRS scores had an endogenous depression symptom constellation.

In summary, the DSRS has suitable psychometrics for use with the original age range of 7-13 year old children. More recent work with adolescents suggests the suitability of this measure of depressive symptoms across the primary and high school age range.

6.6.3 The Revised Manifest Anxiety Scale (Richmond, Reynolds, 1978)

The Revised Children's Manifest Anxiety Scale (RCMAS) originated in an adaptation for children of Taylor's Manifest Anxiety Scale. The development of the RCMAS followed administration of the Children's Manifest Anxiety Scale (Castaneda, McCandless, and Palmero, 1953), a 73 item test, to school children; 28 anxiety items were retained following item analysis. Nine of the original 11 lie scale items were also retained. The RCMAS is a self reported instrument with 2 response fields, simply scored no (0), yes (1). The scoring range is 0-28. The lie scale is similarly scored; the scoring range is 0-9. The lie scale measures social desirability in responding (Hagborg, 1991).

The RCMAS is a commonly used child & adolescent measure of anxiety and has undergone extensive psychometric testing. Internal consistency is high (Murphy et al 2003) and Wisniewski and colleagues study of measurement stability found both the one week test re-test Pearson's r ($r = 0.88$) and the five week Pearson r ($r = 0.77$) suggest a suitably stable research instrument.

There is substantial evidence of convergent validity with significant RCMAS inter-correlation with the State-Trait Anxiety Inventory for Children (Muris et al 2003; Carey et al 1994) and the Screen for Child Anxiety Related Emotional Disorders (Muris et al 1998).

Issues concerning the factor structure of the RCMAS are more unclear. White and Farrel studying 898 US 7th graders reported a best fit factor model including anxious arousal, social evaluation-over sensitivity, worry and a higher order factor (2002); all constructs with considerable construct validity. However, the ability to measure something unique is questioned when considering the divergent validity

between the RCMAS and measures of depression. In one study, albeit with a small sample size of 30 hospitalized “emotionally disturbed children, the RCMAS and Children’s Depression Inventory (CDI) factors were inter-correlated suggesting a “complex relationship between the two factors” (Novell et al 1995). Stark & Laurent investigating 750 US grade 4-7 children reported significant factor overlap between the RCMAS and the CDI, indeed were able to create a 7 item (from 28 anxiety RCMAS items) unique factor “reflecting worry” (Stark & Laurent 2001). Murphy and colleagues investigating 86 children of 6-11 years whose mothers were HIV symptomatic or diagnosed with “AIDS” reported a related finding (2001). The best fit model on structural equation modelling was “dual construct, correlated” rather than two unrelated factors or a single factor (2001).

In summary, the RCMAS is one of the most widely used anxiety measures, it has demonstrated reliability and construct and convergent validity. There is further work needed to clarify the relationship between the RCMAS and measures of depression, however, the RCMAS measures core constructs in the current conceptualization of childhood anxiety.

6.5 Screening Ethical Considerations

6.5.1 Ethical issues involved in the project

Conducting an ethical research project or an ethical integrated research – service provision endeavour such as the SBTP involves considering ethical issues across several domains. Broadly these include doing no harm, obtaining informed consent, maintaining confidentiality both across older and more recent technologies and conducting research or evaluation that is scientifically sound and able to complete the proposed aims.

A process of screening via questionnaires included the theoretical possibility of doing harm. Questionnaires could provide stimuli that may lead to re-experiencing phenomena; PTSD Cluster B symptoms such as flashbacks, nightmares or feelings that the traumatic event was happening again, or Cluster D: autonomic arousal

symptoms such as hyper-vigilance, exaggerated startle response and tachycardia. Experience from the use of the battery by Yule and colleagues and our experience from the pilot school suggested the chosen questionnaire battery would not cause harm.

Questionnaire based screening may also create a recrudescence of feelings, cognitions or behaviours relating to pre-disaster exposure to emotional trauma including past feelings of hopelessness or fears of potential injury or loss of life. That is, the screening questions may remind the individual of non bushfire-related posttraumatic experiences such as past witnessing domestic violence, the experience of child sexual abuse or a wide range of other potentially traumatising events. The possible recrudescence of non-disaster psychological distress by the screening process was a matter of serious concern. One advantage of the Impact of Events Scale questionnaire, as detailed previously is that it attempts to be specific to a given traumatic event by the insertion of the key disaster related word, in this case bushfire, into each question. In this regard the questions become highly specific, for instance, "I thought about the bushfire when I didn't mean to" and are much less likely to reactivate symptoms relating to a non-bushfire related trauma. Both the Revised Children's Manifest Anxiety Scale and the Depression Self-Rating Scale do not have the problem of reactivating past emotional and trauma related experiences because of the specificity of questions relating to current symptoms of depression and symptoms of trait anxiety.

Harm may also be conferred by the screening process generating results that are dissonant with the participants' true emotional distress or depression status. If on the questionnaire an individual scored above case criteria and was not experiencing emotional distress their result would be a false positive result and the child may receive an intervention when it was unnecessary. It is the opinion of this author that the major intervention for primary school children, the guided workbook 'The Bushfire and Me' did not represent an overly invasive procedure. If a child completing the workbook experienced little emotional valency about the bushfires the book would not create a recrudescence of symptoms. The child may at worst be bored at having to complete this task. The systemic implications are more significant. Identification of a child as distressed may cause the family to become over protective of that child, decrease the child's autonomy and slow the natural process of individuation - separation, an expected task of the teenage years.

If the child was significantly depressed or emotionally distressed and did not score above the cut-off the result is termed a false negative result. False negative status may lead the family to be falsely reassured, cease to look for signs of distress or emotional disturbance in their child and the child may “suffer in silence”. Further, the workbook may not be offered to the child and their chance for treatment and recovery diminished. The SBTP strategy to prevent this from occurring was through parent forums, newsletters, and information to teachers and other school authorities to remind parents that individual assessment of children was available to all concerned parents. Information sheets about the possible effects of bushfires on children and adolescents were made widely available to help the identification of children through means other than formal screening.

Obtaining informed consent was integral to the SBTP project plan. A formal, written application to conduct the screening, treatment and intervention trial was submitted by the candidate to the Prince of Wales’ Children’s Hospital Research Ethics Committee. The Ethics Committee members took the view that the world literature supported the stance that screening, and identifying distressed children was standard, or should be standard clinical care. This committee approved the parent consent form used in the screening phase. A copy of the SBTP consent form is in Appendix I. Further, dual approval was obtained with approval from the New South Wales Department of School Education to conduct the SBTP in NSW schools, see Appendix I.

Consent was obtained at the screening and treatment phases. The right to refuse help was respected at all stages of the project. Electronic security was maintained by a separate name and identification data file to the screening results file. Further, questionnaires were stored in a locked, secure space at the Department of Child and Adolescent Psychiatry, Prince of Wales' Children's Hospital.

Screening would not have been ethical unless the stated rationale for screening was honoured. That is the use of information to pro-actively identify children at risk of emotional distress and depression. Further this screening would not have been ethical unless the treatment intervention had not been created. All such activities were completed, indeed to the satisfaction of the NSW Department of School Education which conferred two awards on key SBTP staff including the candidate. Lastly, undertaking unique opportunities such as post-disaster research and interventions can be argued to create a responsibility to share this experience and

knowledge gained with peers. In discharging this responsibility the SBTP has resulted in numerous case conference presentations and several publications; see appendix 2.

6.6 Statistical Analysis

6.6.1 Variables

All SBTP questionnaires were completed on specific SBTP data collection sheets, each with three identifiers for each child: a specific SBTP identification number constructed from the first three letters of the school name and an individual 4 digit code, the participants' initials and date of birth. Data forms were then entered into SPSS (SPSS Inc.), all subsequent data analysis used either SPSS, Minitab for Windows v12 (Minitab Inc.), SPlus v4.5 (Mathsoft Inc.) or Stata v5.0 (STATA Corp.).

The SBTP dataset included both categorical and continuous variables. The former is a variable which is divided into a set of mutually exclusive divisions or categories. One type of categorical variable is a nominal (otherwise termed binary) variable, that is, a variable with only two possible values. Gender status is often cited as an example, although both genotypic and phenotypic gender variations highlight that exceptions are often present and many variables can be considered in a variety of ways. Many bushfire – related questions were YES/NO in format and were coded as nominal variables. Examples include whether the child was at home on the day of the fire, whether there was home damage by the bushfire, if the home was destroyed by the fire or the individual experienced evacuation during the day of the fire. The individual IES and DSRS questions were ordinal variables; that is a categorical variable with possible values placed in a meaningful order such as a rank, see sections 6.4.2 and 6.4.3. School attended was analysed as a factored (nominal) variable, that is variable categories referred to a similar but individually named construct for instance 1, 2 and 3 all referred to separate schools.

The SBTP dataset included numerous continuous (or interval) variables indicating an implied equal distance between points on the scale. Another way of conceptualising continuous variables is a construct with a maximum and minimum

value that can be described by a measure of central tendency such as a mean and a measure of dispersion such as a standard deviation. Examples include age and the total scores of emotional distress, trait anxiety and depression scales. Tables 6.2, 6.3 and 6.4 summarises SBTP variable type for the screening procedure with Primary, High and Infant School children.

6.6.2 Statistical Significance

Statistical significance was set at the $p = .05$ level. Multiple testing can increase the possibility of rejection of the null hypothesis by chance findings. Boneferroni inequality is defined as “the overall alpha for a set of tests will be less than or equal to the sum of alpha levels associated with individual tests” (Weinfurt, 1995, p248). Weinfurt gives the example; the overall alpha for 6 tests each at the .05 significance level is $6(.05)$ equalling an alpha of .30. Two strategies were employed in this thesis to limit the likelihood of type 1 errors. Firstly, the number of statistical tests undertaken has been limited. Indeed the results noted in chapters 8, 9 and 10 of this thesis report analyses of a priori hypotheses rather than ‘automatic’ testing of multiple variables. The latter includes tree-based statistical classification techniques such as SPSS-CHAID which automatically segments data creating multiple tests. Secondly, most reported p values range from .01 to .001 thereby giving some protection against type 1 errors across the tests performed. When significant associations are reported at the .05 level, as is often the case in chapters 11 and 12, evidence for rejecting the null hypotheses in these associations is less strong. Note the measure used in chapter 11 and 12, the Kerry Questionnaire is at the pilot stage of development and probably also confers a degree of measurement error, see chapter 12 for more detail.

Table 6.2:*Summary of SBTP screening variables for Primary Age Children*

<u>Variable name and description</u>	<u>Variable type</u>	<u>Respondent</u>
<u>During the week of the fire was your child:</u>		
At home	nominal	parent
On holiday in New South Wales (non fire area)	nominal	parent
On holiday in New South Wales (fire area)	nominal	parent
On holiday interstate or overseas	nominal	parent
Evacuated to friends or relatives	nominal	parent
Evacuated to hostel, refuge, other	nominal	parent
<u>During the day of the fire:</u>		
Were you separated from your child	nominal	parent
Separated parent remain with the house	nominal	parent
Was a parent a voluntary fire-fighter	nominal	parent
Was your home damaged by the fire	nominal	parent
If yes, did you have to live somewhere else	nominal	parent
Was your home destroyed by the fire	nominal	parent
<u>Impact of Event Scale</u>		
Individual items	ordinal	child
Total and subscale scores	continuous	child
<u>Depression Self-Rating Scale</u>		
Individual items	ordinal	child
Total score	continuous	child
<u>Revised Children's Manifest Anxiety Scale</u>		
Individual items	ordinal	child
Total score	continuous	child

Table 6.3:

Summary of SBTP screening variables for High School Children

<u>Variable name and description</u>	<u>Variable type</u>	<u>Respondent</u>
<u>During the week of the fire was your child _____ :</u>		
At home	nominal	Self-report
On holiday in New South Wales (non fire area)	nominal	Self-report
On holiday in New South Wales (fire area)	nominal	Self-report
On holiday interstate or overseas	nominal	Self-report
Evacuated to friends or relatives	nominal	Self-report
Evacuated to hostel, refuge, other	nominal	Self-report
<u>During the day of the fire:</u>		
Were you separated from your child	nominal	Self-report
Separated parent remain with the house	nominal	Self-report
Was a parent a voluntary fire-fighter	nominal	Self-report
Was your home damaged by the fire	nominal	Self-report
If yes, did you have to live somewhere else	nominal	Self-report
Was your home destroyed by the fire	nominal	Self-report
<u>Impact of Event Scale</u>		
Individual items	ordinal	Self-report
Total and subscale scores	continuous	Self-report
<u>Depression Self-Rating Scale</u>		
Individual items	ordinal	Self-report
Total score	continuous	Self-report
<u>Revised Children's Manifest Anxiety Scale</u>		
Individual items	ordinal	Self-report
Total score	continuous	Self-report

Table 6.4:
Summary of SBTP screening variables for Infant School Children

<u>Variable name</u>	<u>Variable type</u>	<u>Respondent</u>
During the week of the fire was your child: ^a		
At home	nominal	Parent
<u>Kerry vignette questions</u>		
Were you feeling frightened?	nominal	Self-report
Were you feeling sad?	nominal	Self-report
Were you feeling excited?	nominal	Self-report
Were you feeling just normal?	nominal	Self-report
Were you worried that:		
The house would burn down?	nominal	Self-report
Your mother was going to die?	nominal	Self-report
Your father was going to die?	Nominal	Self-report
That you might die?	Nominal	Self-report
Your father might go away?	Nominal	Self-report
Your mother might go away?	Nominal	Self-report
You would be left alone?	Nominal	Self-report
It is now quite a long time after the fire:	Nominal	Self-report
Do you get scary dreams about the fire?	Nominal	Self-report
During the day ... think a lot about the fire?	Nominal	Self-report
Do you try not to think about the fire?	Nominal	Self-report
Do you get headaches?	Nominal	Self-report
Do you get stomach pains?	Nominal	Self-report
Do you think the fire might happen again?	Nominal	Self-report
Do get upset when someone talks about the fire?	Nominal	Self-report
Do you have problems sleeping?	Nominal	Self-report
Do you still feel scared?	Nominal	Self-report

a bushfire-related variables identical to the nominal, parent-report variables used with primary school children.

6.6.3 Checking model assumptions in the data set

Generalised equation model assumption checks are included in the analysis chapters of this thesis. This section includes a brief introduction to model assumption testing with the example of the major outcome variable, the Impact of Event Scale total score (IESSUM) and two predictor variables, total depression score DSRSSUM and total trait anxiety score RMASSUM

The major assumptions are: the model is linear, error terms are independent of each other and of input variables and the error term is normally distributed. Model linearity implies for any change in Y there is an associated change in X and this is a fixed relationship. One test of linearity is a visual review of the relationship between variables.

Consider Figure 6.3 and Figure 6.4 below, scatter plots of the total score of the Impact of Event Scale (IESSUM) of grade 4, 5, 6 children against the major predictor continuous variables total depression score (DSRSSUM) and total trait anxiety score (RMASSUM). In both instances there appears to be a relationship between the variables rather than the 'snow-storm' appearance seen when two variables are not related.

Transformations of predictor variables also test for linearity. Possibilities include $\log(x)$, x^2 and $1/x$ transformations. Model linearity is seen by increasing coefficient values. Lastly, the predictor value can be transformed into an ordinal variable by categorising into quintiles. Again model linearity is denoted by increasing R^2 values.

Residuals are a measure of the relationship between fitted (by the model being tested) and observed data. A data point with a large residual is an outlier. Similar to outliers potentially affecting a sample mean, outliers may be influential to the fit of a model. Residuals can be used to test the model assumptions; by plotting a residual histogram and

Figure 6.1:
Scatter plot of IESSUM versus DSRSSUM for Grade 4, 5, 6 Children

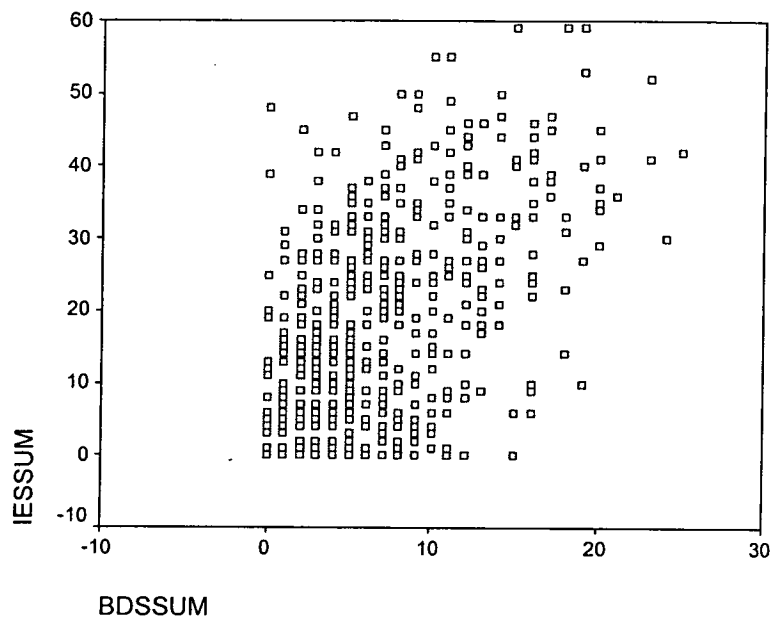
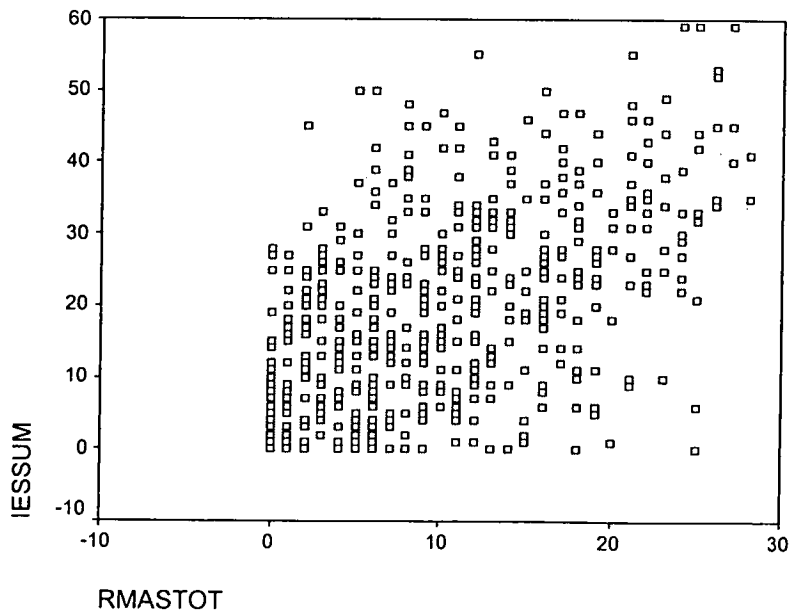


Figure 6.2:
Scatter plot of IESSUM versus RMASTOT for Grade 4, 5, 6 Children



looking for evidence of a normal distribution. Secondly, determining if there is a correlation between the residual terms and variables in the model – the model assumes independence of the error term.

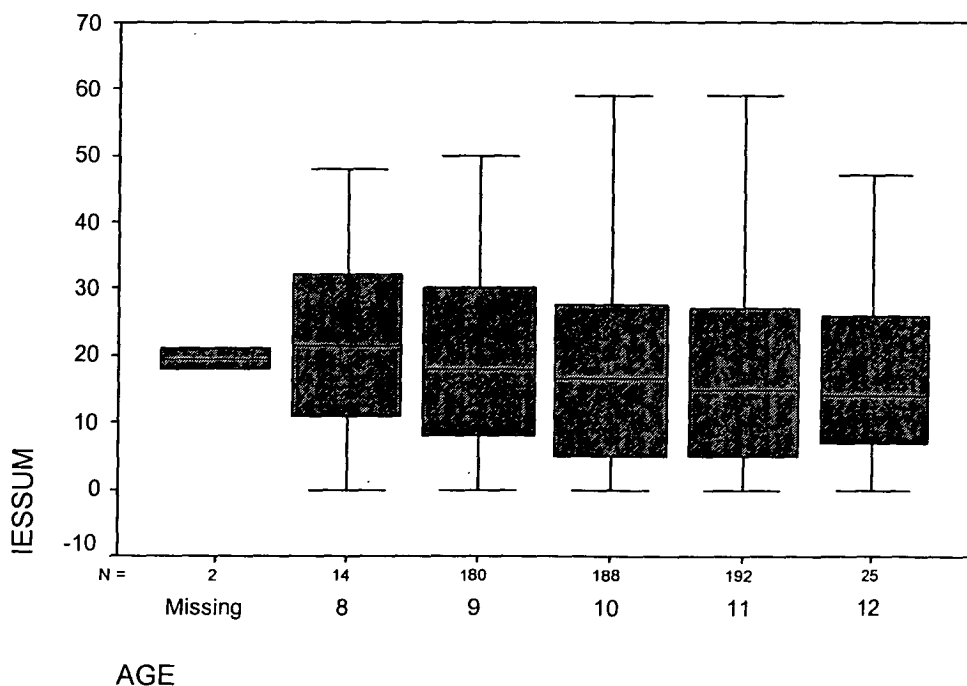
6.4.4 Model sensitivity

Measures of model sensitivity account for the effect of variable outliers that inherently have large residual values. Re-analysis of the model without these outliers may significantly alter the calculated regression coefficient, if so that data point is said to have high leverage (Campbell, 2001).

Referring to Figure 6.5 below, a Boxplot of IESSUM by primary school age group. This plot does not identify any outliers, where boxplot outliers are denoted by individual data points on the plot and are 1.5 to 3 boxlengths from the depicted box. The box represents the interquartile range containing 50% of the sample. If a distribution included outliers one technique is to model with and without the outlying terms and assess for changes in the model fit.

Figure 6.3:

Boxplot of IESSUM by Age for Primary School Children.



CHAPTER 7

DESCRIPTION OF THE SBTP SAMPLE

7.1 Sample Size

The total SBTP sample was 2724 infant, primary and secondary school children. There is little similarity between the screening procedure of infant school children, and older primary and high school children. Accordingly, the infant sample is briefly described in this chapter and in more detail in chapter 11.

The thesis overall includes separate analyses of infant school students (grades 1, 2, 3), primary school students (grade 4, 5, 6), primary and high school students (grades 4 to 12) and children whose parents identified themselves as a member of the volunteer fire-fighting service. A replication study of children and adolescents who experienced a bushfire disaster in 2003 is also included. When a specific subset of the overall sample is analysed, details of that sample are provided in the appropriate analysis chapter.

The sample size of primary and secondary school students, ranging from grade 4 to 12, who participated in the self-report screening, was 2379.

7.2 Age of the Sample

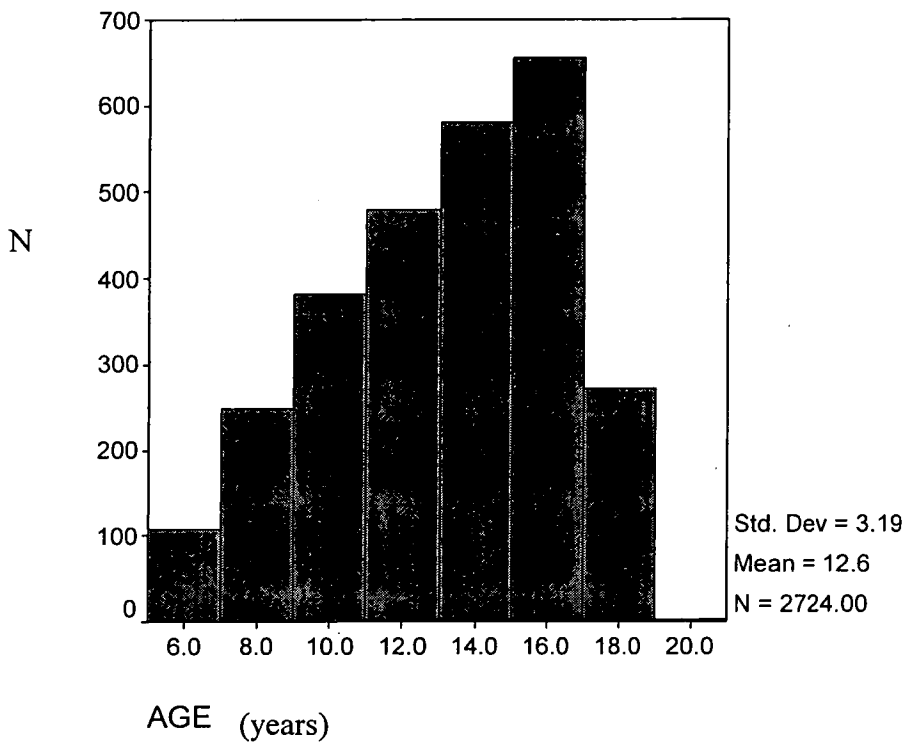
Consistent with a SBTP objective, the screening process included participants across a wide age range (8 – 19 years, mean 13.43 years) and all school grades from grade 4 to grade 12, the last year of secondary schooling in Australia.

Table 7.1
The Sample Age Distribution by Grade

<u>Grade</u>	<u>N</u>	<u>Mean Age (years)</u>	<u>SD</u>
1	105	6.09	0.39
2	138	7.06	0.41
3	103	8.10	0.38
4	214	9.06	0.43
5	204	10.21	0.51
6	183	11.04	0.47
7	330	12.23	0.46
8	295	13.12	1.38
9	287	14.25	0.45
10	322	15.11	1.47
11	321	16.06	0.61
12	224	16.90	0.45

The sample age distribution by school grade is detailed in Table 7.1 above and a histogram of the distribution displayed in Figure 7.1 below. The relationship between age and school grade and the major outcome variables of interest, post-disaster emotional distress and depressive symptoms is modelled in Chapter 7.

Figure 7.1
Histogram of the SBTP Sample Age Distribution



7.3 Gender balance of the sample

The sample gender balance varied from a minimum of 40.1% male in grade 11 to a maximum of 51.8% male in grade 10, see Table 7.2 below. The overall sample gender ratio demonstrated a small over-representation of females: 52.6% female, male 47.4%. This is consistent with Figure 7.2 displays the gender ratio by school grade. There is no obvious pattern across school grades.

Table 7.2*Gender Distribution of the SBTP Sample*

<u>Grade</u>	<u>Male</u>		<u>Female</u>	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
1	49	46.4	56	53.6
2	67	48.7	71	41.3
3	47	46.1	56	43.9
4	99	47.8	108	52.2
5	94	47.5	104	52.5
6	74	43.3	97	56.7
7	164	51.4	155	48.6
8	147	51.7	137	48.3
9	133	47.8	145	52.2
10	159	51.8	148	48.2
11	123	40.1	184	59.9
12	89	41.6	125	58.4

7.4 Socio-demographic factors

Owing to restrictions on data collection imposed by the ethics committee (see chapter 6) no socio-demographic data are available for the sample. However, the socio-demographic attributes of the sample can be imputed from socio-demographic data for the fire-affected area that is available from the Australian Bureau of Statistics (ABS) 1997 Census.

The ABS Statistical Area 7150 closely coincides with the bushfire disaster area. In area 7150 81% of residents were Australian born and only 0.03% were Australian Aboriginal or Torres Strait Islanders. The majority of non-Australian born residents emigrated from an English speaking country and comprised 8.8% of

the total population of this area. Immigrants from a non-English speaking European country or Asia comprised 3.3% and 1.7% of the area's population respectively. There were relatively few single parent households (10.4%). The area is considered 'middle class', consistent with 46% of residents having obtained some post-school qualification and a median annual household income of AUD40-50,000 (Australian Bureau of Statistics, 1997).

7.5 Participation rate

The primary school participation rate was calculated by the number of parents of primary school children who returned to their child's school signed consent forms as a proportion of the total number who received the invitation to participate. 76% of parents provided signed consent.

Little is known in detail about the bushfire experience of the primary school children and their families who did not give consent to screening. However, the returned consent forms of non-consenting parents often included brief written reasons for their decision. The most prominent explanation was their family was "not in the area" during the week of the bushfires, usually because the family was on a holiday away from home. Parents who wrote they were out of the area often also wrote the screening (therefore) was in their opinion "not applicable" to them.

The high school children participation rate was calculated by the number of high school students who attended school on the day of the screening, who gave written consent to participate as a proportion of those who gave consent plus those who did not. An important feature of high school student consent was the ethics committee approval for direct consent to be obtained from high school students. This consent procedure resulted in 97% of high school students participating in screening. Adolescents who did not give consent invariably completed no part of their consent form including the demographic or bushfire-related data. Subsequently, there is little known about the adolescent non-participant group.

7.6 Summary

Parents, infant, primary and secondary school children provided data for this study. Of the total sample of 3131 participants, the screening process for infant school children was not similar to any other school grade and is the subject of chapter 10. This chapter describes the 2379 children from grade 4 to 12 that completed school-based screening, including the sample: age, gender, school grade, sociodemographic characteristics and the study participation rate. The chapter concludes with a discussion of statistical analysis: SBTP variables types and an introduction to bivariate and multivariate statistical tests used in this thesis.

CHAPTER 8

ANALYSIS 1:

EMOTIONAL DISTRESS AND DEPRESSION IN PRIMARY SCHOOL CHILDREN

8.0 Summary

Six months following a bushfire disaster 12% of primary school children, aged 8 to 12 years, experienced significant symptoms of emotional distress. Emotional distress was independently predicted by the child's trait anxiety, depressive symptoms, experience of a bushfire-related evacuation and the child's perceived threat to their parents on the day of the bushfires. Post-disaster screening identified significantly more distressed children than were identified by parents and teachers during the 6 months prior to screening. Many more children were offered and provided a psychological intervention following screening compared to the proceeding 6 months. The costs of the program were within the means of the school district, primarily by the temporary redeployment of school counsellor staff and the program was well accepted by parents, mental health and education staff.

8.1 Method

Methodological issues are discussed in depth in Chapter 6. The details below are additional comments that relate specifically to the content of this chapter, which concerns the investigation of the SBTP hypotheses as they pertain to primary school children.

8.2 Participants

The study population consisted of all children in grades 4 to 6 attending public school education in the designated disaster area and meeting the school inclusion criteria (see chapter 6). Eleven primary schools fulfilled one or more of these criteria. One primary school principal refused participation of students or staff from his school in this project. School size varied greatly from small ‘cottage’ schools with fewer than 30 students to state funded schools that typically have several hundred students. The study sample is described in depth in chapter 7.

8.3 Measures

The screening battery is described in chapter 6, sections 6.4.2 to 6.4.4, including the published psychometric properties of instruments. This description includes the rationale for using an abbreviated version of the 15 item Impact of Event Scale (Horowitz, Wilner, Alvarez, 1979). Table 8.1 reports the internal consistency of the SBTP screening questionnaire battery, the Impact of Event Scale, Birlson Depression Self Rating Scale (Birlson, 1981) and Revised Children’s Manifest Anxiety Scale (Richmond, Reynolds, 1978), for the Primary school (grade 4, 5, 6) SBTP sample. For all measures the Cronbach alpha results are above the 0.80 criteria of Carmines & Zeller (1979), and it can be concluded these measures are suitable for research use with this sample.

Table 8.1:*Internal Consistency of Measures used in the SBTP*

	<u>Cronbach Alpha</u>	
	<u>SBTP</u> <u>Total^a</u>	<u>Grade</u> <u>4, 5, 6^b</u>
Impact of Event Scale (IES)	0.92	0.86
Depression Scale (DSRS)	0.88	0.81
Anxiety Scale (RCMAS)	0.94	0.92

a sample size, n =2379

b sample size, n = 602

8.4 Statistical analysis

The parent-report of bushfire related factors, the child-report screening measures and an overview of variables and statistical tests are described in greater detail in chapter 6. In summary, gender (male='1', female='0') was analysed as a binary covariate. Age, IESSUM (total IES-13 score), RMASSUM (total RMAS score) and DSRSSUM (total DSRS score) were analysed as continuous variables. School attended was analysed as a factored (nominal) variable. All other variables were analysed as binary (1/0) covariates. Analysis included bivariate statistical tests such as χ^2 for two categorical variables, and t Tests when one variable was binary (1/0), the other continuous. Multivariate analysis, such as generalised equation modelling, was used to adjust for the influence of potential confounders, such as age and gender when considering variables of primary interest, such as the total distress score (IESSUM). Multivariate analysis also accounted for the relative contribution of bushfire related variables, depressive symptoms and trait anxiety to the goodness of fit of such a model. Statistical significance was set at the .05 level. To decrease the possibility of type 1 errors only a priori hypotheses were investigated and most multivariate associations are reported at the $p = .001$ level. Statistical analysis is

considered in more detail in chapter 6, section 6.6; bivariate analysis in 6.6.2, generalised equation modelling in 6.6.3.

8.5 Results

76% of students from the 11 schools studied returned parent signed consent forms and subsequently participated in screening. Those parents not giving consent to screening commonly cited that the project did not apply to them because they were 'out of the area' during the fires. No other information is available on the non participants.

The study population comprised 602 Primary grade students, aged 8 to 12 years (Mean = 10.1 years, SD = 0.9 years); 54.6% (n=322) female, 45.4% (n=279) male. Participants lived in an area where 81% of residents were Australian born and where only 0.03% were Australian aboriginal or Torres Strait Islanders. The majority of non-Australian born residents emigrated from an English speaking country and comprised 8.8% of the total population of this area. Immigrants from a non English speaking European country or Asia comprised 3.3% and 1.7% of the area's population respectively. There were relatively few single parent households (10.4%). The area is considered 'middle class', consistent with 46% of residents having obtained some post-school qualification and a median annual household income of \$AUS 40-50,000 (Australian Bureau of Statistics, 1997).

The percentage of children exposed to a range of disaster-related experiences is summarised in Table 8.2. These percentages may represent an underestimate, as unfortunately parents did not respond to items in up to one third of cases (see column 2, Table 8.2).

8.5.1 Post-disaster emotional distress

Figure 8.1 is a histogram depicting the total IES-13 emotional distress score (IESSUM) of children attending primary school. The appearance is that of a skewed normal distribution with a long right hand tail. An overview of the relationship of emotional distress and age, and gender can be seen in Figure 8.2, a box-plot of

IESSUM by gender and Figure 8.3, a graph of the 95% confidence intervals of IESSUM by age. These results are suggestive of no gender or age differences in symptoms of emotional distress. To control for a range of potential explanatory variables, these relationships will be reanalysed using a multivariate model in section 8.5.2.

Figure 8.1:

Histogram of the Total Emotional Distress Score for Primary Age Children

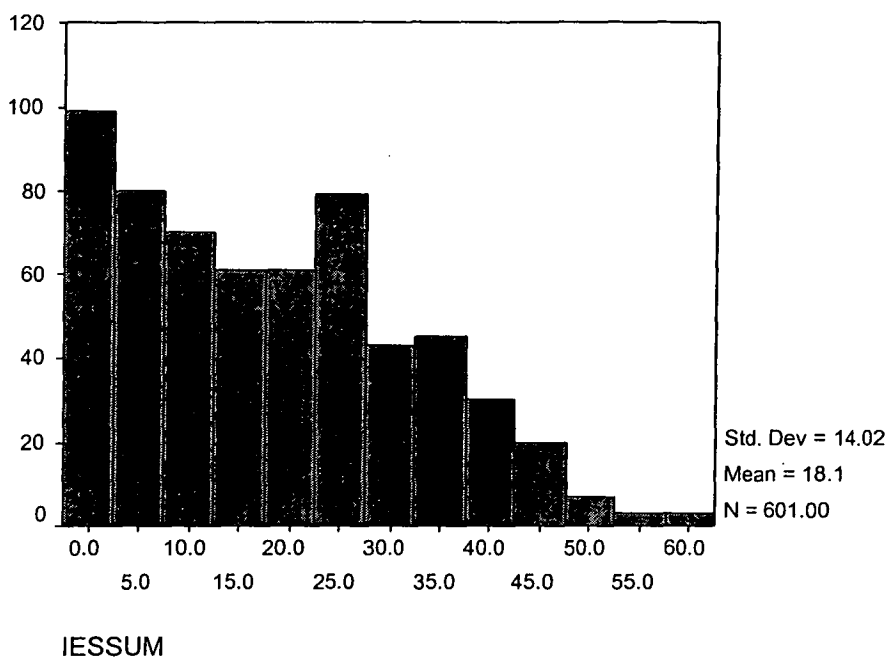


Figure 8.2:

Box-Whisker Plot of Total Emotional Distress Score for Primary School Children by Sex

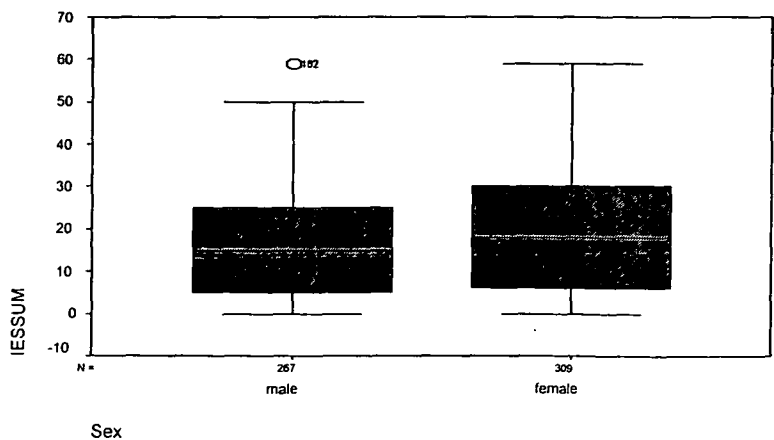


Figure 8.3:

Mean of the Total Emotional Distress Scores and Confidence Intervals (95%) for Primary Age Children by Age.

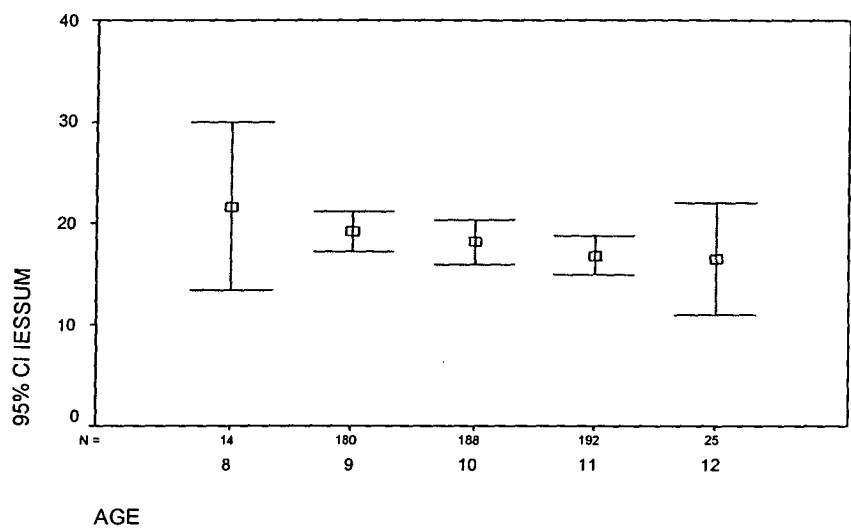


Table 8.2:

Bushfire-related factors and missing data.

	<div>Occurrence of</div> <div>event or perception</div>	<div>Missing data</div>
	<div>%</div> <div>N</div>	<div>%</div> <div>N</div>
Exposure to the bushfires	87.6 (403)	23.5 (141)
Experience of evacuation	37.5 (151)	24.1 (145)
Perceived threat to self	5.6 (23)	32.1 (193)
Perceived threat to parents	9.6 (39)	32.1 (193)
Child separated from parents	33.8 (154)	24.3 (146)
Home damaged	7.2 (33)	24.3 (146)

Table 8.3 summarises the sample test battery results, overall and by school grade. Six months after the bushfire disaster 11.5% of participants reported no emotional distress symptoms. Mild trauma related symptoms were reported by the majority of students. Using the cut-off advised by Horowitz modified for a 13 question scale, 12% of the sample (n = 72) experienced moderate to severe levels of distress symptoms (IES-13 >36). IES-13 items most frequently validated as “often” included: “I tried to remove the bushfire from my memory”, “I tried not to think about the bushfire”, “any reminder of the bushfire brought back feelings about the bushfire” and “pictures of the bushfire popped into my head”. Only three IES-13 questions demonstrated a gender difference: female students more commonly reported “I had trouble with sleep because pictures or thoughts about the bushfire popped into my head” ($X^2_3 = 11.33, p < 0.01$), “I had dreams about the bushfire” ($X^2_3 = 8.89, p < 0.05$) and “any reminder brought back feelings about the bushfires” ($X^2_3 = 7.85, p < 0.05$).

Table 8.3:
Summary of Screening Battery for Total sample and Primary School Grades

	<i>IESSUM</i> <i>Mean SD</i>	<i>DSRS</i> <i>Mean SD</i>	<i>RCMAS</i> <i>Mean SD</i>
Total (Primary school)	16.19 (2.51)	6.45 (4.98)	9.46 (7.35)
Grade 4	19.82 (13.69)	6.68 (4.99)	9.51 (7.26)
Grade 5	18.59 (14.93)	7.21 (4.99)	10.61 (7.65)
Grade 6	15.50 (13.08)	5.33 (4.78)	8.12 (6.95)

8.5.2 Symptoms of emotional distress (IESSUM): multivariate analysis

The total trait anxiety score, total depression score (DSRSSUM), experience of evacuation, and perceived threat to parents significantly predicted the IESSUM index independently of other possible covariates (Table 8.4). Higher symptom scores for anxiety and depression and earlier school grade were associated with increased symptom scores for emotional distress. The experience of an evacuation procedure and the presence of a perceived threat to one or both of the parents of a child were also both associated with increased symptom scores for emotional distress. Variables that did not exert a statistically significant independent effect on emotional distress scores were age, gender and school of attendance.

Table 8.4:
Results of generalised linear modelling.

<u>Response variable</u>	<u>Explanatory variable</u>	<u>β</u>	<u>SD</u>	<u>T</u>	<u>P</u>
<u>IESSUM</u>	Total anxiety score	0.70	0.10	6.77	<0.001
	DSRSSUM	0.76	0.15	5.02	<0.001
	Experienced evacuation	3.60	1.09	3.30	0.001
	Perceived threat to parents	4.13	1.91	2.17	0.03
<u>DSRSSUM</u>	Total anxiety score	0.39	0.03	13.90	<0.001
	IESSUM	0.08	0.02	5.12	<0.001
	Perceived threat to parents	1.86	0.60	3.10	0.002

8.5.3 Post-disaster depressive symptoms

The mean Depression scale score was 6.45 (SD 4.98). Using the DSRS cut-off of 16 suggested by Yule and Udwin (1991), 4.7% (n = 44) of the sample reported symptoms consistent with a depressive illness. The items most frequently endorsed were “I feel very bored” and “I am (not) easily cheered up”. Two other items frequently endorsed by the sample: “I have horrible dreams” and “I get tummy aches” are not specific to depression and may equally be attributed to PTSD. The mean anxiety scale score was 9.46 (SD 7.35). Using the RMAS cut-off of 19 cited by Yule and Udwin (1991), 14.1% (n=85) of the sample reported symptoms consistent with high trait anxiety.

8.5.4 Symptoms of depression (DSRSSUM): multivariate analysis

The total anxiety score, the IESSUM index, and perceived threat to parents significantly predicted the DSRSSUM index independently of other possible covariates (Table 8.4). Higher symptom scores for anxiety and emotional distress were associated with increased symptom scores for depression. Similar to the IESSUM model, age, gender and school of attendance did not exert a statistically significant independent effect on depression scores .

8.6 Discussion

The majority of parents of children in this sample perceived their child had been exposed to the bushfire. In this study bushfire exposure was reported as a simple yes/no response (see Section 6.6.1 and Table 6.2), this minimal exposure information does not allow comment in more detail about the exposure construct. Chapter 13, ‘The Canberra Bushfire Disaster: a replication study’, considers bushfire exposure in more detail including proximity to a bushfire measured in meters, seeing smoke and flames and hearing fire-related noises.

Over one third of primary school children were evacuated from their homes on the day the bushfire disaster affected their suburb. Evacuation is a potentially trauma-inducing event. Evacuation involves leaving the perceived safety of the home, often seeing actual flames and dense smoke, and the danger of being caught by the fire when moving to a place of perceived safety. Many children told stories of being impeded in their efforts to leave by a traffic jam of other evacuees.

A prevalence of emotional distress of 12% in a large, representative sample of primary grade children was found. Despite differences in the timing of post-disaster assessment and screening instruments used, this emotional distress prevalence is similar to the report of 13% of children experiencing trauma related dreams or nightmares 8 months following a bushfire disaster (McFarlane, 1987) and 5% of school children fulfilling the more stringent PTSD diagnosis 3 months following a hurricane disaster (Shannon, Lonigan, Finch, Taylor, 1994). The prevalence is lower than the reports of individuals experiencing events with greater threat potential and trauma exposure, for instance adolescent girl survivors of a ship sinking (Yule, 1992) and children in a schoolyard subject to sniper fire (Nader, Pynoos, Fairbanks, Frederick, 1990).

The prevalence of depression in this sample was similar to estimates derived from community prevalence studies of non-traumatised children and adolescents. A review by Angold found most studies reported depression rates of <5%, with a cluster around the 2-3% prevalence rate (Angold & Costello, 1994). Goodyer's review of 12 studies, generally reporting 6-month prevalence data, found a child and adolescent depression rate of 1.8 - 8.9% (Goodyer, 1995). In the bushfire sample no gender difference in rates of depression in children less than 12 years of age was found, a similar finding to community studies (Kashani, Carlson, Beck, Hoeper, 1987; McGee, Feehan, Williams, Partridge, Silva, Kelly, 1990). The absence of elevated levels of depression in this sample probably in part reflects the low experience of loss of life, bereavement and home destruction reported by individuals. When home damage and destruction was reported, after controlling for a number of potentially confounding variables, depressive symptoms did significantly co-occur with PTSD symptoms. This may be related to depressive symptoms being a direct result of the traumatic experience. However, in samples of non-traumatised children and adolescents significant comorbidity between depression and anxiety disorders (Cooper & Goodyer, 1993) has also been reported. Further understanding of the

relationship between depressive and PTSD symptoms in the post-disaster environment requires a longitudinal research design with details of premorbid, pre-disaster psychopathology.

Another potential explanation for the lack of an elevated prevalence of depression in this sample is that trauma experienced in the context of a natural disaster may be less likely to be depressogenic than personal trauma, or trauma from a man-made disaster. The developmental model outlined in chapter 2 highlights the importance of family resources and community factors. An example of a likely societal influence on pathological behaviour is the rate of suicide decreases during times of war (Gelder, Gath, Mayou, 1989), possibly due to greater social coherence and mutuality during times of threats to society. In the post-disaster period neighbours collectively helped in the clean-up, and there was local and community wide fund raising for disaster relief. Such community factors, as well as increasingly complex relationships with peers during the child and adolescent developmental stages (Rutter & Rutter, 1993) may lead some children to feel less isolated and more socially supported, less lonely and depressed during the post-disaster phase. Testing this hypothesis is outside the scope of the present study.

The results of multivariate analysis suggested a significant relationship between increased emotional distress and female gender, younger students, elevated trait anxiety and increased depressive symptoms. An unexpected finding was that the child's perception their parent may have died during the bushfire was a more significant factor in explaining the variance of emotional distress scores than the perception that they themselves may have died. Methodological problems require caution in interpreting this finding; parental reporting of a child stating they feared for their own, or their parent's lives is likely to be a substantial underestimate when compared to direct child self-report. However, it is possible that children at this developmental stage consider their own death as an unlikely abstraction, whereas the death of a parent may be more conceivable, threatening and trauma inducing to the child. Further research using child self-reporting is required. A simplistic exposure question such as "was your child at home on the day of the fire?" did not differentiate the distressed from the non distressed group. However, the experience of evacuation on the day of the fire, probably a proxy measure of more severe fire exposure, was significantly associated with increased emotional distress scores independently of the other possible covariates. Whilst weak bivariate relationships

were demonstrated between increased separation experience and home damage and subsequent emotional distress, these relationships did not remain significant when other variables were adjusted for in a multivariate analysis. An important negative finding was that school attended was not an independent predictor of child emotional distress.

These significant findings are consistent with the overarching developmental concept of the expectation of complexity (Carolina Consortium, 1996) and symptoms being related to both trauma-related events as well as factors inherent to the individual. In the schema of Pynoos, Steinberg and Wraith (1995) trait anxiety is an example of a distal aetiological factor, the experience of disaster-related evacuation is a proximal factor.

Multivariate modelling of the depression scores found significant independent relationships with total emotional distress score, trait anxiety and perception of threat to the parents. The substantial overlap in significant independent contributors to the IESSUM and DSRSSUM model and the fact that each outcome was significantly predicted by the other, suggests that either symptoms of emotional distress and depression are a central feature of children's responses to traumatic events or, as previously discussed, the experience of a bushfire disaster includes exposure to aetiological factors of both depression and PTSD. Pre-disaster symptoms of depression may also confer a vulnerability to emotional distress following a traumatic event. Whilst valid retrospective data of past mental health status may help to answer this question, a longitudinal design with quantification of pre-disaster functioning is a more rigorous and powerful methodology.

Attempts to progress our understanding of children's emotional response to natural disasters can be guided by the developmental perspective. Future studies should consider new data collection of pre-disaster resilience and vulnerability factors of a biological nature including functional polymorphisms of genes implicated in neurotransmitter systems (see Caspi et al., 2002; 2003), and alterations in the Hypothalamus-Pituitary-Adrenal axis, psychological factors such as the individuals pre-disaster self esteem, self efficacy, temperament and previous experience of trauma including abuse and maltreatment, family factors such as warmth, parenting style and cohesiveness and peer and school factors. Further work is also required to better understand proximal factors such as threat perception and the effectiveness of post-disaster interventions such as psychological first aide.

From a service provision perspective, a case note review found that fewer than 20 primary school children presented to either a school psychologist or child and adolescent mental health professional for bushfire-related symptoms during the 6 months prior to the school based screening procedure. Following the program 72 children with IES-13 scores in the severe range were offered an intervention. Furthermore, parents of children with mild to moderate IES-13 scores were invited to discuss their child's needs with treatment staff; many of these children and families were provided some therapeutic assistance. The process of testing for distress itself had benefits in the post disaster environment. Communication of the child's emotional status to parents encouraged a dialogue about the distressed child and the child's emotional management. School-based testing presented the added advantages of employing existing resources in the 'ownership' of a post-disaster intervention model and focusing usually scarce resources on individuals at greatest need. Such arguments, along with the dissonance between the number of children receiving treatment pre- and post screening suggests widespread, school based, proactive, post-disaster investigation for emotional distress is an undertaking worthy of further research and development.

CHAPTER 9

ANALYSIS II: AN EXPLORATION OF THE INTERACTION BETWEEN THE AGE OF CHILDREN AND THEIR POST-DISASTER EMOTIONAL RESPONSE

9.0 Summary

Post-disaster emotional distress and depressive symptoms across a wide child and adolescent developmental range are reported. Significant independent associations were found between total depression and emotional distress scores. Both symptom groups were also independently associated with disaster-related variables and exhibited complex, non-linear relationships with the child's school grade. Younger children were at specific risk of depressive symptoms in the post-disaster environment. Children in the 'middle' school years were at greatest risk for post traumatic stress symptoms. This analysis suggests that important developmental differences in post-disaster psychological responses.

9.1 Method

Methodological issues are discussed in depth in Chapter 6. The details below are additional comments that relate specifically to the content of this chapter. The SBTP hypotheses outlined in section 5.2.1 relating to emotional distress and 5.2.2 relating to depressive symptoms will be tested across the grade 4 to grade 12 developmental range. Further, specific hypotheses concerning age will be tested: 5.2.1 hypothesis 3: younger children will report significantly higher mean emotional distress scores than older children and 5.2.2 hypothesis 3: younger children will report significantly higher mean depression scores than older children.

9.2 Participants

The study sample consisted of all children in grades 4 to 12 (the latter being the final year of secondary school education), attending State school education in the designated disaster area. In brief, schools were included in the project if: the school was destroyed (1 school) or damaged by fire; homes of children attending the school were destroyed or damaged by the fire; or large areas of blackened, fire damaged land needed to be traversed to attend school. Eleven primary schools fulfilled one or more of these criteria. Primary school size varied greatly from small 'cottage' schools with fewer than 30 students to state funded schools that typically have several hundred students. Two Secondary schools fulfilled the inclusion criteria. The study sample is described in detail in chapter 7.

9.3 Measures

The screening battery is described in chapter 6, sections 6.4.2 to 6.4.4, including the published psychometric properties of instruments. This description

includes the rationale for using an abbreviated version of the 15 item Impact of Event Scale (Horowitz, Wilner, Alvarez, 1979). Whilst secondary school children completed the full 15 item scale, for the purposes of comparison across all school grades the IES-13 will be reported for both primary and secondary students. Table 9.1 summarises the internal consistency of the SBTP screening questionnaire battery, the Impact of Event Scale, Birleson Depression Self Rating Scale (Birleson, 1981) and Revised Children’s Manifest Anxiety Scale (Richmond, Reynolds, 1978), for the total SBTP sample and three summary school grade categories. For all measures the Cronbach alpha results are above the 0.80 criteria of Carmines & Zeller (1979), and it can be concluded these measures are suitable for research use with this sample.

Table 9.1
Internal Consistency of Measures used in the SBTP

	<u>Cronbach Alpha</u>			
	<u>SBTP</u>	<u>Grade</u>		
	<u>total</u>	<u>4, 5, 6.</u>	<u>7, 8, 9.</u>	<u>10, 11, 12.</u>
Impact of Event Scale (IES)	0.92	0.86	0.87	0.87
Depression Scale (DSRS)	0.88	0.81	0.85	0.91
Anxiety Scale (RCMAS)	0.94	0.92	0.89	0.97

9.4 Statistical analysis

An overview of parent-report of bushfire related factors, the child-report screening measures and an overview of variables and statistical tests are described in greater detail in chapter 6. In brief, and as summarised in chapter 8; gender

(male='1', female='0') was analysed as a binary covariate. Age, IESSUM (total IES-13 score), RMASSUM (total RMAS score) and DSRSSUM (total DSRS score) were analysed as continuous variables. School attended was analysed as a factored (nominal) variable. All other variables were analysed as binary (1/0) covariates. Analyses included bivariate statistical tests such as χ^2 , used to compare two categorical variables such as gender and perception of threat and t Tests when comparing one categorical variable such as gender with a continuous variable such as emotional distress.

In addition to the description of variables of primary interest, such as the total distress score (IESSUM), multivariate analysis techniques such as generalised equation modelling were used to adjust for the influence of potential confounders, such as age and gender, as well as to determine the relative independent contribution of explanatory variables. Statistical significance was set at the .05 level. To decrease the possibility of type 1 errors only a priori hypotheses were investigated and most multivariate associations are reported at the $p = .001$ level. More details of the statistical analysis employed is given in chapter 6, section 6.6; bivariate analysis in 6.6.2 and generalised equation modelling in 6.6.3.

9.5 Results

The study population comprised 2,379 Primary and Secondary school students, aged from 8 to 19 years, (mean = 13.43 years, SD =2.49 years). The majority of the children ($n=1449$, 60.90%) were in secondary school. The number of children varied from 183 to 329 in each grade. Female participants (52.23%) outnumbered males (47.77%). The socio-demographic profile of the sample is described in detail in section 7.4.

9.5.1 Bivariate analysis of bushfire-related factors

Table 9.2 below depicts the relationship between school grade, gender and bushfire-related variables such as separation experience. Of the total sample, 309

individuals experienced an evacuation experience on the day of the bushfire disaster. Evacuation (see Figure 9.1, Table 9.2) occurred more frequently in individuals in the earlier school grades, this finding was statistically significant. There was no significant gender difference in individuals experiencing evacuation.

As detailed in Table 9.2 many children experienced separation from their parents on the day of the bushfires ($n = 514$, 30.3%). Many children who were separated from their parents remained at home, potentially under threat from the bushfire yet without parental supervision ($n = 422$, 26.7% of the total sample) rather than at a holiday activity or with friends or relatives. As with evacuation experience there was no significant relationship between separation or separated and at home and the child's gender. There was no significant difference in the age of separated children ($t_{1687} = -1.167$, $p = .243$), or the age of separated children who remained at home ($t_{1378} = 0.163$, $p = .871$).

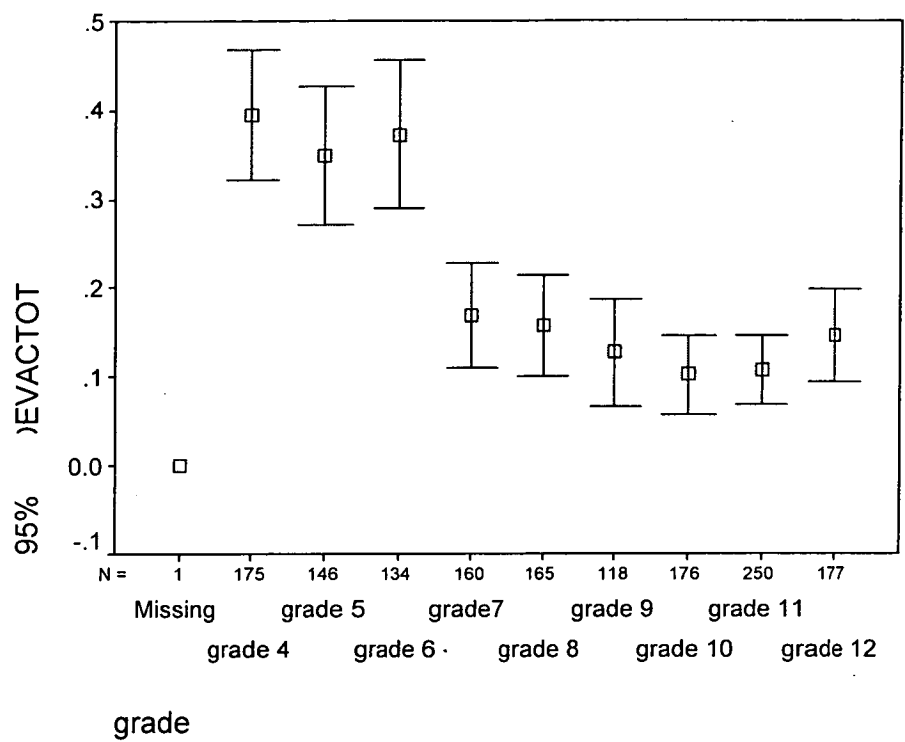
Many children experienced bushfire-related home damage ($n = 109$, 6.7%), however, few experienced their home being destroyed during the fires ($n = 21$, 1.5%). As would be expected for such events, there was no significant relationship with the child's school grade. There was no gender difference in the experience of home damage. More male students experienced their home destroyed. This finding requires caution given the small sample size.

Table 9.2

Bivariate analysis of Bushfire-related factors and participant gender and school grade.

<u>Factor</u>			<u>Relationship to</u>	<u>Relationship to</u>
<u>Experienced</u>	<u>N</u>	<u>%</u>	<u>grade (ANOVA)</u>	<u>gender (χ^2)</u>
Evacuation	309	20.6	$F_8 = 10.995$, $p = .000$	$\chi^2_1 = 0.285$, $p = \text{NS}$
Child sep.	514	30.3	$F_8 = 4.394$, $p = .000$	$\chi^2_1 = 1.204$, $p = \text{NS}$
Sep. at home	422	26.7	$F_8 = 2.046$, $p = .058$	$\chi^2_1 = 0.800$, $p = \text{NS}$
Home damage	109	6.7	$F_8 = 0.240$, $p = \text{NS}$	$\chi^2_1 = 0.138$, $p = \text{NS}$
Home destroyed	21	1.5	$F_8 = 0.413$, $p = \text{NS}$	$\chi^2_1 = 5.877$, $p = .015$

Figure 9.1
95% Confidence intervals of evacuation experience by school grade.



9.5.2 Post-disaster emotional distress

Bivariate relationships between the study variables and emotional distress symptoms are reported in Table 9.3. Statistically significant higher mean emotional distress scores were found in females, and individuals who experienced numerous bushfire-related events: evacuation experience, child separation from parents, separated child remaining at home, home damage and destruction and if the child thought they or their parent may die during the fires. A statistically significant relationship was also found between emotional distress and lower school grade and lower student age (Pearson's correlation p (2 tailed) $< .000$).

Table 9.3

Bivariate analysis of Bushfire-related factors and the post-disaster emotional distress.

<u>Measure</u>	<u>Emotional distress (IESSUM)</u>				<u>t</u>	<u>(2 tailed) p</u>
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>		
Gender	Male		Female			
	12.03	14.05	15.54	14.81	$t_{2221} = -5.722$	<.001
Grade	4, 5, 6	18.09	14.01			
	7, 8, 9	12.42	12.92			
	10, 11, 12	9.35	11.41		$F_8 = 46.522$	<.001
<u>Experience</u>	<u>YES</u>		<u>NO</u>		<u>t</u>	<u>P</u>
Evacuation	21.90	17.10	11.65	13.04	$t_{1546} = -11.329$	<.001
Child sep.	16.58	16.51	12.28	13.08	$t_{1639} = -5.626$	<.001
Separated at home	16.09	15.83	13.02	13.82	$t_{1533} = -3.700$	<.001
Home damage	23.49	18.94	12.99	14.54	$t_{1579} = -7.233$	<.001
Home destroyed	22.65	14.07	14.07	14.54	$t_{1334} = -2.603$	<.001
Self may die	21.70	15.19	15.64	14.85	$t_{890} = -4.097$	<.001
Parent may die	21.29	15.98	15.25	14.85	$t_{891} = -4.662$	<.001

Multivariate modeling suggested that symptom scores for depression (DSRSSUM index), perceived threat of death to self, perceived threat of death to parents, grade at school and experience of evacuation during the week of the fires significantly predicted the IESSUM index independent of the other possible covariates (Table 9.4). In the multivariate model gender did not significantly predict the IESSUM index. Symptom scores for depression (DSRSSUM) demonstrated a non-linear relationship with symptoms of emotional distress (Figure 9.2); increased symptom scores for depression were associated with increased

symptoms of emotional distress. Class at school also demonstrated a non-linear relationship with symptom scores for emotional distress (Figure 9.3). Adjusted symptom scores were lowest in the lower and higher grades and highest in the middle grades (i.e., grades 7-9). The experience of evacuation during the week of the fires and the presence of a perceived direct threat to the life of either the parent or to self were also both associated with increased symptom scores for emotional distress.

Table 9.4

Multivariate associations of emotional distress (IESSUM) scores with explanatory covariates. Results of generalized linear modeling (final models).

<u>Outcome</u>	<u>Explanatory variable</u>	<u>β</u>	<u>SD</u>	<u>P</u>
Log _e IESSUM R ² =42.2%	Constant	2.39	0.19	<.001
	Log _e DSRSSUM	-1.09	0.17	<.001
	(Log _e DSRSSUM) ²	0.38	0.04	<.001
	Perception of threat of	0.37	0.06	<.001
	Death to self			
	Grade at school ^a	-0.08	0.03	<.01
	(Grade at school) ²	-0.01	0.003	<.01
	Experience of evacuation	0.18	0.04	<.001
	during week of fire			
	Perception of threat of	0.24	0.06	<.001
	death to parents			

^a Entered as a continuous covariate.

Figure 9.2

Modelled relationship of emotional distress symptom score to depression symptom score.

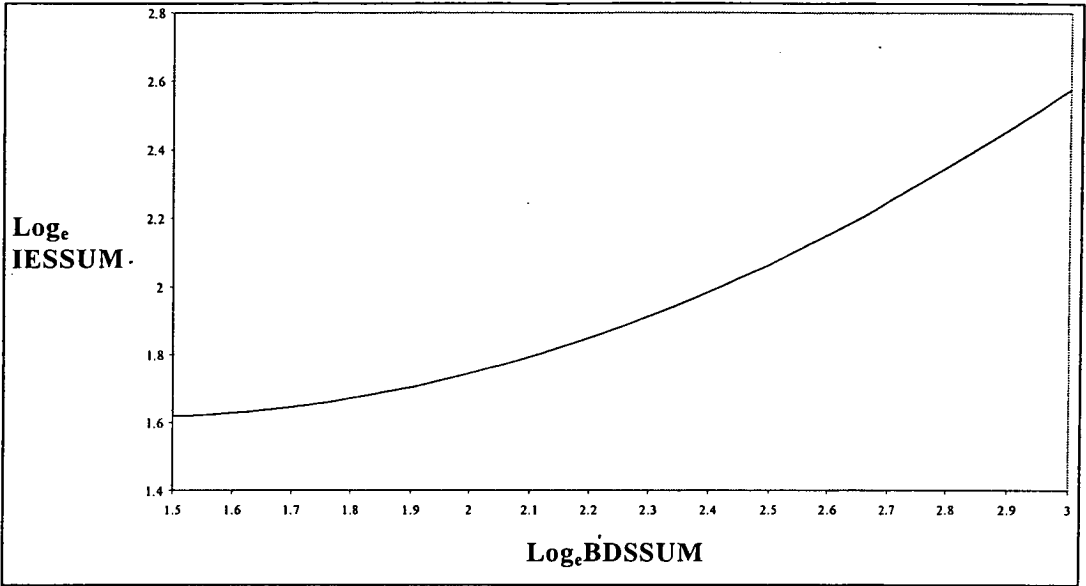
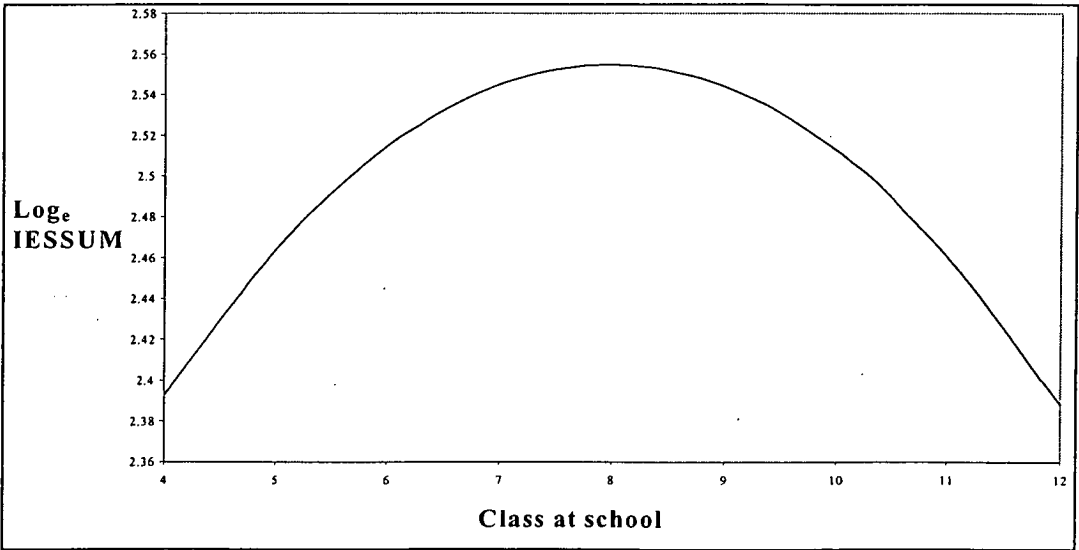


Figure 9.3

Modelled relationship of emotional distress symptom score (IESSUM) to class at school.



9.5.3 Post-disaster depressive symptoms

Bivariate relationships between the study variables and depressive symptoms are reported in Table 9.5. Statistically significant higher mean depressive symptom scores were found in female students and individuals who experienced a bushfire-related evacuation, separation from parents, and the perception either they or their parents would die during the disaster. These were the same variables that were statistically significantly related to higher mean emotional distress scores. Age (Pearson's correlation p (2 tailed) = $<.001$) and school grade ($F_8 = 115.945$, $p = <.001$) were also significantly related to depressive symptoms, however, the direction of the relationship was opposite with older students experiencing more depressive symptoms and less emotional distress symptoms.

Multivariate modelling suggested that the IESSUM emotional distress index, the total anxiety score (RMASUM), grade at school, experience of evacuation during the week of the fires, and experience of evacuation on the day of fires to either a refuge or to friends/relatives significantly predicted the DSRSSUM index independently of the other possible covariates (Table 9.5). Gender did not significantly predict the DSRSSUM index. However, evidence of a significant interaction between sex and grade at school was found (not shown in Table 9.5; $\beta = -0.011$, $SD=0.005$, $p <.05$), this suggested that DSRSSUM levels were systematically lower across all school grades in males than in females.

Table 9.5

Bivariate analysis of Bushfire-related factors and the post-disaster depressive symptoms

<u>Measure</u>	<u>Depressive symptoms (DSRSSUM)</u>				<u>t</u>	<u>(2 tailed) P</u>
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>		
Gender	Male		Female			
	5.73	5.10	7.16	5.21	$t_{2183} = -5.434$	<.001
Grade	4, 5, 6	6.45	4.98			
	7, 8, 9	6.21	5.27			
	10, 11, 12	6.89	5.38		$F_8 = 4.059$	<.001
<u>Experience</u>	<u>YES</u>		<u>NO</u>		<u>t</u>	<u>P</u>
Evacuation	7.13	5.58	6.04	4.89	$t_{1423} = -3.07$	<.01
Child separation	7.04	5.44	6.19	4.99	$t_{1606} = -2.813$	<.01
Separated at home	6.95	5.65	6.29	4.92	$t_{1497} = -2.056$	<.05
Home damage	8.49	6.41	6.23	4.95	$t_{1545} = -4.050$	<.001
Home destroyed	10.07	7.94	6.39	5.08	$t_{1300} = -2.764$	<.01
Self may die	8.87	6.22	5.81	4.87	$t_{870} = -6.121$	<.001
Parent may die	8.74	4.61	5.63	4.72	$t_{868} = -7.133$	<.001

Table 9.6

Multivariate associations of depressive symptoms with explanatory covariates. Results of generalized linear modeling (final models).

<u>Outcome</u>	<u>Explanatory variable</u>	<u>β</u>	<u>SD</u>	<u>P</u>
Log _e IESSUM R ² = 56.9%	Constant	2.31	0.41	<.001
	Grade at school	-0.23	0.02	<.001
	(Grade at school) ²	0.02	0.002	<.001
	Evacuation on day of fire	0.19	0.04	<.001
	To friends or relatives			
	Log _e RMASSUM	-1.19	0.35	<.001
	(Log _e RMASSUM) ²	0.57	0.13	<.001
	(Log _e RMASSUM) ³	-0.07	0.01	<.001
	Log _e IES-13	0.88	0.37	<.05
	(Log _e IES-13) ²	-0.37	0.16	<.05
	(Log _e IES-13) ³	0.06	0.02	<.01
	Experienced evacuation	-0.12	0.03	<.001
	during week of fire			
	Experienced evacuation	0.16	0.04	<.001
	Day of fire to refuge			

Other variables significantly related to depressive symptoms following bivariate analysis (Table 9.5) did not make a statistically significant independent contribution to the multivariate model.

Symptom scores for anxiety and emotional distress demonstrated a non-linear relationship with symptom scores for depression (Table 9.5; Figures 9.5 and 9.6 respectively). Higher symptom scores for anxiety and emotional distress were associated with increased symptom scores for depression. Class at school, a variable likely to reflect both chronological age and developmental maturity, also

demonstrated a non-linear relationship with symptom scores for depression (Table 9.5, Figure 9.7).

Adjusted symptom scores were highest in the lower and higher grades, and lowest in the middle grades (i.e., grades 8-10) (Figure 9.7). For both the models of emotional distress (IESSUM) and depression (DSRSSUM) all reported associations of response variables with explanatory covariates were independent of the other possible covariates. Modelling indicated no substantial clustering effects by school for either of the outcomes investigated.

Figure 9.4

Modelled relationship of depression symptom score to total anxiety score .

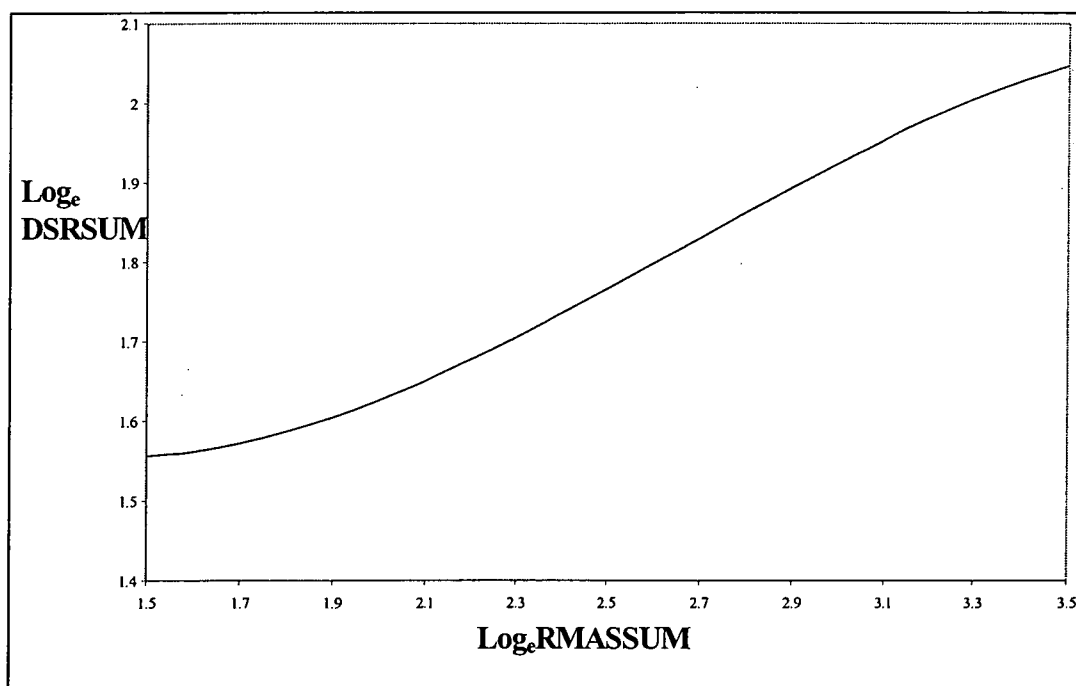


Figure 9.5

Modeled relationship of depression symptom score to emotional distress

symptom score.

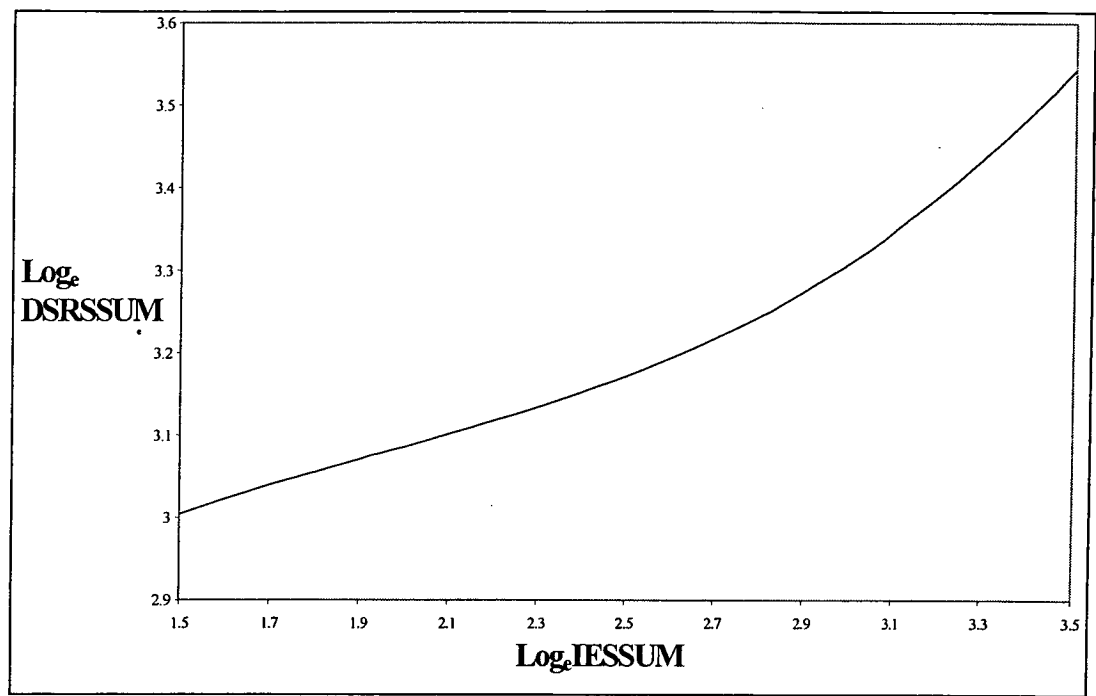
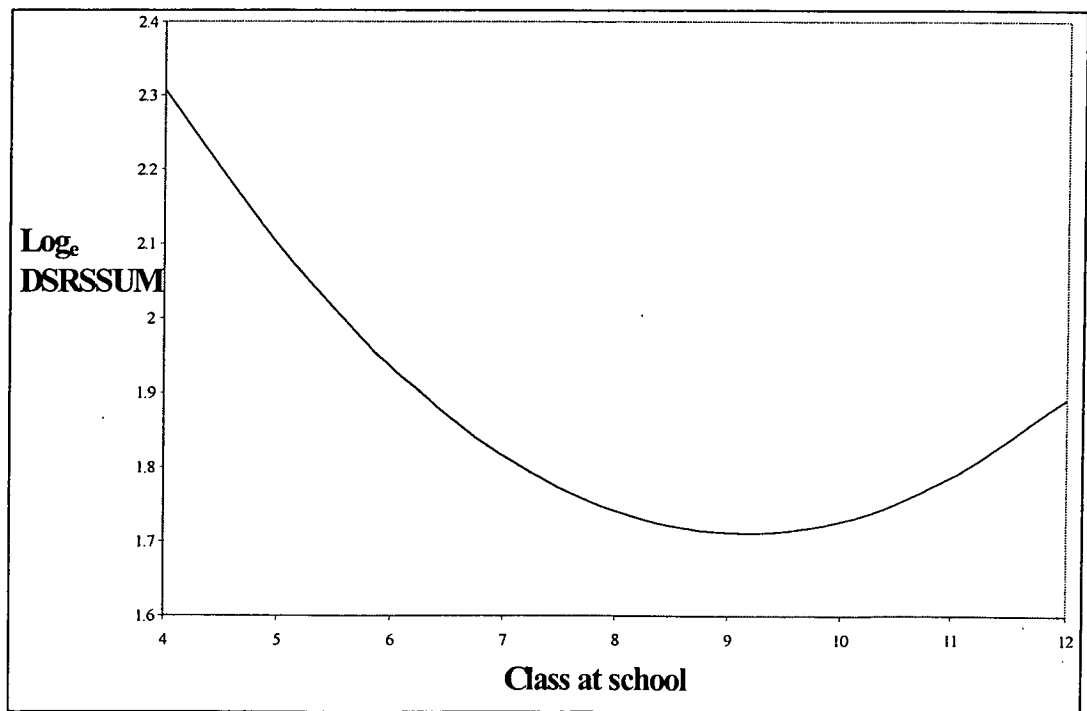


Figure 9.6

Modelled relationship of depression symptom score to class at school.



9.6 Discussion

Predictions from developmental theory (see chapter 2) are that organisms tend to become more complex and sophisticated over time and the balance of resilience and vulnerability factors is not static rather the interplay of such factors is dynamic. Accordingly, it was hypothesised that the rate of emotional distress and depression would vary across the child to adolescent developmental span.

It is reported in the chapter that across school grades 4 to 12 symptoms of emotional distress was statistically significantly higher in children who experienced trauma-related (proximal) events such as damage to their home, the individual's perceived threat to themselves and threat to their parents and depressive symptom score. Higher emotional distress scores were also related to factors inherent to the individual such as earlier school grade. These findings are consistent with earlier work relating perceived threat to self to greater emotional distress (Parker, 1977; Lonigan et al., 1994) and extend such findings by reporting the potentially traumogenic effect of the child's perception that their parent may die during a natural disaster. In this post-disaster sample, the findings by Green (1991) and Shannon (1994) of higher levels of emotional distress among female subjects compared with males was not confirmed.

A complex, non-linear relationship between emotional distress symptoms and school grade was found. Children in middle grades (7-9) reported the most emotional distress symptoms. Older adolescents and younger children reported fewer symptoms. The finding in adolescents was possibly due to a greater ability to adapt on the part of these older children, both to the disaster and to the post-disaster environments. Better adaptation with age may reflect the utilization of cognitive responses such as mature defensive styles, external attribution and internal locus of control. This group may also demonstrate greater ability to articulate distress and therefore receive both nurture and assistance in reprocessing disaster related cognitions and feeling states. Stronger peer affiliations and group factors may also be important, so too, it may be adolescents are less affected by family factors such as parent's experiencing distress and psychopathological states.

The finding of low rates of emotional distress amongst younger children (grades 4-6) is contrary to the hypothesis that younger children will experience higher emotional distress symptom scores (see section 5.2.1). The explanation in this sample does not appear to be instrument reliability or a measurement error problem. Possible explanations may involve mediating factors not measured in this research. Such mediating factors may include: protection from emotional distress by greater parent proximity to younger children during a disaster (which is likely to be bi-directional: both parent and child seek closer proximity to the other) , differential levels of parent distress across parental age and changes in the individuals coping and other protective and vulnerability across the child and adolescent developmental span.

Across the school grade 4 to 12 developmental span, the number of post-disaster depressive symptoms was significantly associated with an individual's higher trait anxiety, earlier school grade (although depressive symptoms rise again after grade 10), evacuation experience and emotional distress score. When depressive symptoms were stratified by age, there was a greater age-dependent effect in females than in males. In the predictive models tested, school grade made a greater contribution than the child's age. This is consistent with the clinical impression that school grade is a better approximation of an individual's developmental level than age.

Students in grades 8-10 (approximate age range 13-15 years) had the lowest mean depression scores. Mean depression scores increase in grades 11 and 12, consistent with epidemiological studies that find adolescents self-report increasing rates of depression and depressive symptoms with increasing age (McGee et al., 90; Verhulst & Van Watum, 1993). In chapter 8 it was reported that the level of depression in primary school students in this post-disaster sample was similar to reported rates cited in reviews of childhood depression (Angold & Costello, 1994; Goodyer, 1995). However, the greater self-report of depressive symptoms in younger children (grades 4-6, age range 9-11 years) rather than adolescents in this sample is not consistent with epidemiological findings in non-traumatized samples where a robust research finding is that adolescents report more depressive symptoms (Kashani, 1987; McGee et al., 90). One postulate is that, given the relatively elevated child versus adolescent depression scores along with the independent relationship between depression scores and emotional distress and

disaster variables such as evacuation experience, younger children are more vulnerable to post-disaster depressive symptoms. Pynoos and colleagues postulated several mechanisms to explain the PTSD-depression co-occurrence including secondary depression as a result of persistent PTSD symptoms and disaster related effects on the family leading to, for example, parent distress or emotional withdrawal which in turn is a potential aetiological factor in depression symptoms in the child (Pynoos, Steinberg, Wraith, 1995).

Our cross-sectional methodology was unable to differentiate persistent primary versus secondary depression. However, there are several possible explanations for our findings. It is possible that depressive symptoms are inherent to the post-disaster emotional response of younger children, or that the threat of loss (actual loss of life, housing and possessions was not extreme in this disaster) is a more powerful etiological factor for depressive symptoms in the younger age group. Alternatively, there may be a strong post-disaster relationship in younger children between the prevalence of exposure to causal factors for both depression and emotional distress, for example the co-occurrence of experience of loss and fire exposure. The developmental model highlights other possible hypotheses that require further investigation. These include exploration of both biological (e.g. genetic, neuroendocrine) and psychological resilience and vulnerability factors. Lastly, whilst more is known of the alterations of 'just-world' beliefs and other cognitive schema following physical and sexual abuse, little is known about the outcome of abused children who subsequently experience a type 1 trauma such as a natural disaster.

CHAPTER 10

ANALYSIS III

SPECIFIC GROUPS: THE CHILDREN OF VOLUNTEER FIREFIGHTERS

10.0 Summary

Post-disaster emotional distress, depressive symptoms and experience of bushfire-related factors and events are compared between the children of volunteer firefighters and other children. Of 2378 children aged 8 to 19 years, 240 children had a volunteer firefighter parent. The children of volunteer firefighters reported statistically significant higher mean emotional distress scores but not depressive symptom scores. Children of volunteer firefighters were more likely than other children to have experienced a bushfire-related evacuation, separation from parents, home damage and destruction. Such children also had a higher perception of threat to themselves and their parents. However, having a parent who was a volunteer firefighter did not independently predict emotional distress or depression symptoms in a multivariate model. In this sample, parent volunteer firefighter status is best understood as an indirect risk factor for emotional distress.

10.1 Introduction

Research has highlighted the relationship between the child's emotional response to trauma and event-related factors, for example increased traumatic event exposure (Lonigan, Shannon, Taylor, Finch & Sallee, 1994; Nader, Pynoos, Fairbanks & Frederick, 1990), perceived life threat during the event (Parker, 1977; Pynoos, Frederick, Nader, Arroyo et al., 1987) and separation experience from parents (McDermott & Palmer, 1999). Predictors of the psychological response to trauma include pre-event coping ability (Vernberg, Silverman, La Greca, & Prinstein, 1996), attribution style (Joseph, Brewin, Yule & Williams 1991) and locus of control (Weiss, Marmar, Metzler, & Ronfeldt 1995).

Possible aetiological factors for emotional distress not directly related to the trauma include vicarious contact with significant people in the individuals' life who are themselves experiencing posttraumatic stress disorder (PTSD). An example would be an abnormal psychological state of a parent affecting the psychological well-being of their child. There has been little research in this area. There is some evidence of transgenerational effects in Nazi Holocaust survivor offspring. Reports include increased offspring vulnerability to PTSD and adverse responses to stresses later in life (Yehuda, Halligan & Grossman, 2001; Kellerman, 2001). The prevalence of PTSD was not elevated in the offspring of Australian Vietnam veterans, although this group did self-report decreased family affective responsiveness and family problem solving (Davidson & Mellor, 2001).

Firefighters and other emergency workers report psychopathology following traumatic events: rescuer helplessness, intrusive memories and perceptual re-experiencing symptoms and the common experience of dissociative symptoms (Marmar, Weiss, Metzler & Ronfeldt, 1996). Many Australian volunteer firefighters feel their safety is threatened during the course of their duties (Bryant & Harvey, 1996). Further, Australian emergency services personnel experience significant emotional distress with 32% of 469 volunteer firefighters meeting PTSD criteria 4 months post bushfire disaster (McFarlane, 1986). Symptom persistence was the norm, if distressed at 4 months post-disaster, the majority was still distressed 29 months post disaster (McFarlane, 1986). Persistence of parent psychopathology may enhance the likelihood of adverse psychological effects on the child. The aim of this

analysis is to investigate whether children of volunteer firefighters were more likely than other children to have experienced a bushfire-related evacuation, separation from parents, home damage and destruction, whether they experienced greater perception of threat about themselves or their parents and experienced higher levels of post-disaster emotional distress and depression. The SBTP hypotheses outlined in section 5.2.4 relating to the children of volunteer firefighters will be tested across the grade 4 to grade 12 developmental range:

1. The children of volunteer fire fighters will report lower mean emotional distress scores than other children.
2. The children of volunteer fire fighters will report higher mean depression scores than other children.
3. There will be no difference in the relationship of emotional distress and depressive symptoms to bushfire-related variables and individual factors (age, gender, trait anxiety) in the children of volunteer fire fighters and other children.

10.2 Method

Methodological issues are discussed in depth in Chapter 6. This analysis utilised the grade 4 to 12 sample ($n = 2378$ children) described in chapter 9. A new nominal (1/0), explanatory variable is included in this analysis: whether (by parent report for primary school children or youth report for high school children,) either parent was identified as a volunteer firefighter.

10.3 Participants

The overall SBTP sample is described in detail in Chapter 7. The grade 4 to 12 sample is described in section 9.2.

10.4 Measures

The screening battery is described in chapter 6, sections 6.4.2 to 6.4.4. As with the procedure used in Chapter 9, for the purposes of comparison across all school grades the 13 question version of the Impact of Event Scale (Horowitz, Wilner, Alvarez, 1979) is used in this analysis. Table 9.1 summarises the internal consistency of the SBTP screening questionnaire battery. Carmines & Zeller (1979) suggest Cronbach alpha scores of 0.80 or greater are satisfactory for epidemiological research. In the case of the SBTP screening questionnaire all the subscales met the 0.80 threshold.

10.5 Statistical analysis

An overview of parent-report of bushfire related factors, the child-report screening measures and an overview of variables and statistical tests are described in greater detail in chapter 6. As summarised in chapters 8 and 9; gender (male='1', female='0') was analysed as a binary covariate. Age, IEESUM (total IES-13 score), RMASSUM (total RMAS score) and DSRSSUM (total DSRS score) were analysed as continuous variables. School attended was analysed as a factored (nominal) variable. All other variables were analysed as binary (1/0) covariates. This included the new variable relating to the volunteer firefighter status (1/0) of a child's parent. Analyses included bivariate statistical tests using two categorical variables, such as the χ^2 test, and t tests when variables include categorical and continuous data. Statistical significance was set at the .05 level. To decrease the possibility of type 1 errors only a priori hypotheses were investigated and most multivariate associations are reported at the $p = .001$ level.

10.6 Results

Of the children assessed 25.6% (154/601) primary school children and 4.8% (86/1777) high school children had a parent who was a volunteer firefighter active during the week of the bushfire disaster. In this group there was an over-representation of female (57.1%) versus male students (42.9%). Children of

volunteer firefighters were significantly younger (11.63 years (2.51) versus 13.73 years (2.71) ($t_{1566} = 11.004$, $p < .0001$) than other children.

As detailed in Table 10.1 there was no statistically significant difference in mean depression scores between the children of volunteer firefighters and other children. The mean emotional distress scores were statistically significantly greater for children of volunteer firefighters than other children. Children of volunteer firefighters were also more likely than other children to have experienced a statistically significantly greater exposure to a bushfire evacuation experience, separation from parents during the bushfires, if separated from parents being at home and in potential danger, and home damage and destruction during the bushfire disaster. A statistically significantly greater number of children of volunteer firefighters than other children expressed the opinion that they thought they would die, or their parents would die during the bushfire disaster.

Previously published research using a generalised linear model (linear regression) reported independent predictors of child emotional distress include post-disaster depressive symptoms, perceived threat to self or parent, evacuation experience and school grade (McDermott & Palmer, 2002; see chapter 9). Predictors of post-disaster depression included emotional distress score, anxiety score, evacuation experience and school grade (McDermott & Palmer, 2002). When reanalysed to include volunteer firefighter status, a parent who was a volunteer firefighter was not a significant independent predictor of emotional distress and depression scores once other important covariates had been adjusted for.

Table 10.1

Bivariate analysis of Bushfire-related factors, post-disaster emotional distress and depression and parent volunteer firefighter status.

<u>Volunteer firefighter status</u>						
	<u>YES</u>		<u>NO</u>		t	(2 tailed) P
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>		
IESSUM	16.96	14.69	13.61	14.51	$t_{1522} = -2.227$.026
DSRSSUM	7.07	5.20	6.37	5.08	$t_{1291} = -1.202$.230

<u>Volunteer firefighter status</u>					
	<u>YES</u>		<u>NO</u>		χ^2
	<u>N</u>	<u>%^a</u>	<u>N</u>	<u>%^b</u>	<u>P</u>
Experienced evacuation	27	(31.7)	277	(20.5)	$\chi^2_1 = -11.329$.014
Child separation	62	(62.0)	414	(28.3)	$\chi^2_1 = -5.626$.000
Separated at home	53	(53.5)	351	(24.1)	$\chi^2_1 = -3.700$.000
Home damage	15	(15.1)	85	(5.81)	$\chi^2_1 = -7.233$.000
Home destroyed	8	(9.3)	9	(0.72)	$\chi^2_1 = -2.603$.000
Self may die	13	(27.1)	100	(12.31)	$\chi^2_1 = -4.097$.003
Parent may die	18	(37.5)	132	(16.30)	$\chi^2_1 = -4.662$.000

a - percent all children who had volunteer firefighter parents
b – percent of all children who did not have a volunteer firefighter parent

10.7 Discussion

Symptoms of emotional distress but not depression were higher in children of volunteer firefighters. This is consistent with the children of volunteer firefighters also experiencing statistically significant higher rates of proximal aetiological factors

for emotional distress such as bushfire-related evacuation and separation experience and perceived threat to self and parents. Why the children of volunteer firefighters were more often separated from parents, and if separated at home and potentially in danger, cannot be answered from SBTP data. However, possible explanations include a volunteer firefighter parent being suddenly required to attend a bushfire thereby decreasing the available parent supervision. Other possibilities include a failure of volunteer firefighter parents appreciating the danger to their family or holding community rather than a personal orientation towards bushfire-related risk. The findings of a statistically significant increase in home damage and home destruction if the child's parent was a volunteer firefighter may be a chance error, more likely given the low occurrence of home damage and destruction in this sample.

The threat perception of volunteer firefighter children about themselves and parents was statistically significantly higher than other children. Greater perception of threat to parents may be a reasonable appraisal of the dangers of being a volunteer firefighter during a bushfire disaster. Interestingly, their parent's involvement in volunteer firefighter training activities and successfully negotiating past firefighting duties seems not to have inoculated these children against increased threat perception. Greater perception of threat to self is likely to be related to the increased evacuation and separation experience of this group. In the multivariate predictive model of emotional distress, parent volunteer firefighter status did not independently predict emotional distress. One conclusion is that in this sample parent volunteer firefighter status per se was not a direct causal factor of a child's emotional distress. Rather, parent volunteer firefighter status was an indirect risk factor mediated by the child's increased threat perception and evacuation and separation experience.

As cited in chapters 8 and 9, this research tested only part of a comprehensive developmental model. There may be other aspects of being in a family with a volunteer firefighter that potentially explains the low rate of post-disaster depressive symptoms and higher mean emotional distress scores in the children. For example volunteer firefighter status may be a self selection of individuals resilient to developing depressive symptoms after an adverse event. This resiliency may be conferred to their offspring via biological (e.g. genetic, temperament) or environmental mechanisms. Resiliency to depression may also be conferred by 'family held' cognitive schema relating to post-disaster optimism, self efficacy or

altruistic views about the benefit of assisting neighbours and other community members after a natural disaster. A more realistic and pragmatic event appraisal may also prevent the vulnerability to depression conferred by post-disaster 'catastrophizing' and other cognitive distortions.

Professional and volunteer rescue and emergency workers are frequently exposed to traumatic events. Recent research confirms these groups are at risk for PTSD and other adverse psychological sequelae of trauma (Marmar, Weiss, Metzler & Ronfeldt, 1996; Fullerton, McCarroll, Ursano & Wright 2002). The issue of parent-child concordance of post-disaster emotional distress, and the possible parent transmission of emotional distress is a new research area and these results need replication. Understanding these relationships would be improved if future research considered a more detailed quantification of parent disaster exposure and parent psychopathology, as well as premorbid child and adult vulnerability factors. A practical outcome of this research is children of volunteer firefighters, especially those with high threat perception are a suitable group for attempts to build psychological resilience prior to bushfire seasons and for post-disaster selective interventions.

CHAPTER 11

ANALYSIS IV

SPECIFIC GROUPS: BUSHFIRE- RELATED CONCERNS IN INFANT SCHOOL CHILDREN

11.0 Summary

Infant School children completed a 20-item questionnaire concerning post-disaster feelings and concerns. Preliminary evidence is provided for the validity of the screening procedure. Many Infant School children affirmed post-disaster negative feeling states soon after the bushfire. Many children cited fears about dying and up to 50% stated concerns many months later. The girls attained a statistically significant higher mean symptom score. No differences across age and school grades were detected, or between those who had experienced evacuation or separation during the day of the bushfires and those who had not.

11.1 Introduction

Members of the SBTP intersectoral working group and parents from the pilot school wished to include Infant School students (Grades 1-3; approximate age 6-8 years) in the screening procedure and any subsequent interventions. However, it was unknown if Infant School children could self-report their post disaster distress. It was conceptualized that this ability was related to the child's age, or more fundamentally, to the child's intellectual development which "comprises the growth of more sophisticated executive control strategies, increasing thoroughness in information processing, the emergence of an ability to comprehend higher order relationships and increased flexibility" (Rutter & Rutter, 1994).

The development of these more sophisticated control strategies draws upon earlier epigenetic theories. During Piaget's stage of concrete operations (occurring around age 5-6 years) the child builds upon the ability to create internal representations developed in the preoperational stage (Piaget & Inhelder, 1969). The child can now make deductive inferences, including seeing the views of another. Although there are caveats which must be attached to Piaget's theory, including the need to progress through successive cognitive phases, the concept that higher functioning is predicated by past mastery is generally accepted. Constructs such as self-reflection and acknowledging and naming physiological and feeling states are required for the valid use of self-report measures designed to identify such states.

At the time of the SBTP there was no self-report measure of emotional trauma that could be easily used as a mass screening measure with the Infant School group. Epidemiological cross-sectional studies such as the Isle of Wight Study (Rutter, Tizard, Yule, Graham, & Whitmore, 1976; Rutter, 1989) and the Western Australian Child Health Survey (Zubrick et al., 1995), or birth cohort studies such as the Dunedin Multidisciplinary Health and Development Study (DMHDS) (McGee et al., 1995) utilized adult reports of children's psychopathology. Commonly the Child Behavior Checklist (Achenbach, 1991) or Rutter Scales (Rutter et al., 1970) have been used. Some studies such as the DMHDS (McGee et al., 1995) have also used the self-reports of 5-9 year old children obtained from structured instruments, in this case the Kiddie Schedule for Affective Disorders and Schizophrenia (Chambers et al., 1980). Such measures, however, do not include questions designed to detect

PTSD. The CBCL does include an anxiety-depression subscale but no specific measure of emotional distress. Further, the CBCL is a lengthy measure (112 items) and therefore is not easily used as a screening tool. Its use would also impose a significant financial cost if employed with a sample of several thousand children.

Given the lack of self-report instruments for use with younger children and the validity-related limitations of the SBTP screening battery in this age group, the SBTP self-report questionnaire battery was not used with the younger children in the study. The steering committee instead resolved to trial a simplified child self-report screening instrument for Infant School children.

11.2 Hypotheses

Hypotheses relating to Infant School students are detailed in section 5.2.3 and include:

1. Infant School students (grades 1, 2, & 3) will be able to indicate persisting bushfire-related emotional distress by answering simple yes/no questions.
2. The female Infant School children will score significantly higher than the males on the measure of emotional distress.
3. There will be no statistically significant differences in mean emotional distress score between school grades or student age.
4. Emotional distress and the individuals' bushfire experience:
 - (a) Infant School children exposed to the bushfire will have a higher mean emotional distress score.
 - (b) Infant School children separated from parents on the day of the bushfire will have a higher mean emotional distress score.
 - (c) Infant School children evacuated on the day of the fire will have a higher mean emotional distress score.

5. Emotional distress and the individual's appraisal of the threat of the bushfire:

(a) Infant School children who perceived that they may have died during the event will have a higher mean emotional distress score.

(b) Infant School children who were worried that their parents may have died during the event will have a higher mean emotional distress score.

11.3 Method

Overall SBTP methodological issues are discussed in depth in chapter 6. A discussion on screening in child and adolescent mental health is included in section 4.4. Deviations from the SBTP screening protocol used with the older children are discussed below.

11.4 Measures

Hypothesis 5.2.3 (1) states that Infant School children would be able to provide useful answers on a series of simple, reading age appropriate trauma-related questions presented with a yes/no response format.

The Infant School students were asked 20 yes/no response questions. Some members of the SBTP intersectoral working group were concerned about the potential of exacerbating bushfire-related distress in this group of young children by asking direct bushfire-related questions. It was therefore agreed that the children would be presented with a simple drawing of a young person outside an intact house, with what appeared to be fire and smoke coming from a nearby hill. The person was named "Kerry", a name that could apply to either a boy or girl in Australia. Students were asked about Kerry's feelings (a) "at that time (of the fire)" and (b) "quite a long time after the fire." It was postulated that children would draw on their own experiences, feelings and cognitions to answer these questions about Kerry. It is

important to re-state that the majority of parents of Infant School children attending the pilot school, as well as members of the SBTP intersectoral working group wished Infant School children could be included in the screening process. The abovementioned postulate, that children would draw on their own experiences when answering the questions about Kerry was advice received from and a recommendation of the intersectoral working group. This postulate was not based upon a priori analysis of the research literature on the cognitive capacity of 6-8 year old children.

The 20 questions were influenced by items on the Impact of Event Scale (Horowitz et al., 1979), by the diagnostic criteria for PTSD and by the SBTP hypotheses relating to perception of threat to self and parents and to separation experience. The internal consistency of the Kerry questionnaire was .85. See Appendix II for the Kerry questionnaire.

11.5 Procedure

Approximately 1-2 weeks after the return of the signed parent consent forms, SBTP screening personnel attended Infant School classes. One SBTP member conducted the session with the assistance of the class teacher. The process employed was similar to that used for screening the older school students. The infant screening procedure was agreed upon by the working group then provided to the screening personnel as a typed protocol which was discussed with the relevant staff of each school prior to the screening process being commenced.

The protocol detailed that:

- (1) The class teacher was first to obtain the attention of the class.
- (2) The class teacher was to provide a neutral introduction and inform the students that the 'guest' (the SBTP member) was going to do some activities with them.
- (3) Students were to be asked not to sit in groups, but to sit at single desks if available.

(4) The Kerry questionnaire was then to be distributed. Students were to be asked to put their name and grade on the top of the questionnaire, then the SBTP member was to read out the brief Kerry vignette:

"This is a story about Kerry. Kerry goes to school just like you do. Kerry's family live in a house. It is a lovely house surrounded by lots of tress. One day Kerry's family heard on the radio that a bushfire was burning near their home. Kerry went outside and saw lots of smoke.

We'd like to ask some questions.

Firstly, we want you to pretend you were Kerry."

(5) The yes/no scoring boxes on the form were then to be explained to the class, aided by discussion of the example, "Did you have any breakfast this morning".

(6) Each question on the questionnaire would then be slowly read aloud by the SBTP member. Students were to be encouraged to answer YES or NO by ticking the appropriate box.

(7) The completed forms were to be collected and checked for the student's name.

(8) The SBTP member would then encourage a class discussion of the children's thoughts about Kerry. It was expected that this would usually lead to a class discussion about the children's bushfire experiences.

11.6 Participants

A total of 310 Infant School students aged from 5 to 9 years, ($M = 8.20$, $SD = 4.62$) were screened with this procedure. The children were evenly distributed across the three school years and 49.7% of the participants were female.

11.7 Statistical analysis

The collection and analysis procedures applied to parent information, such as bushfire-related factors, were identical to those employed with the primary school

student sample and which were discussed in detail in chapter 6. Gender was analysed as a nominal covariate. School attended was analysed as a factored (nominal) covariate. The individual Kerry questionnaire items were analysed as nominal variables. Age and the overall emotional distress score, which was obtained by summing the 20 Kerry questionnaire items, were analysed as continuous variables. Statistical significance was set at the .05 level. To decrease the possibility of type 1 errors only analysis of a priori hypotheses rather than 'automatic' testing of multiple variables were performed, as well as report of associations with p values in the range .01 to .001. When significant associations are reported at the .05 level the evidence for rejecting the null hypothesis for these associations is less strong.

11.8 Results

11.8.1 Use of the 'Kerry' Questionnaire

The Infant School children appeared to be very engaged in completing the Kerry Questionnaire. The majority of children sat quietly, listened to the training questions and then diligently followed the verbal instructions and answered all questions. Across the 20 questions the incidence of missing data ranged from 2.4% to 8.9%, the mean incidence of missing data being 4.9%. The rate of incorrectly answered questions (answering both yes and no options) was 0.7%.

11.8.2 Bushfire-related experiences and perception of threat in Infant School children.

The associations between parent-report of bushfire-related experiences and perception of threat in Infant School children and parent-reports of child psychopathology are detailed in Chapter 12. In summary, the Infant School children, like other Primary School children, were exposed to the bushfire disaster. Infant School children experienced potentially emotional trauma inducing events such as

evacuation from their home (53.6%) and separation from their parents on the day of the bushfire disaster (28.4%). The concerns of some children were such that they stated to their parents that they thought they would die (5.9%) or that their parents would die (8.1%) during the bushfire disaster.

11.8.3 Responses to individual ‘Kerry’ Questionnaire items 1-10: “At the time (of the bushfire)”

Table 11.1 and Figure 11.1 summarize the Infant School children’s imagined feelings of Kerry “at the time (of the bushfire)”. Most of the students felt that in response to the fire-related picture and vignette, Kerry would not be feeling ‘normal’ (74.5%). They thought that Kerry would be feeling either ‘frightened’ (79%) or ‘sad’ (68.1%). Some of the Infant School children (10.6%) thought Kerry would feel ‘excited’. Many of the Infant School children reported that Kerry would be concerned about separation and loss issues. Many children thought Kerry would be ‘worried that the house would burn down’ (81.4%). Many children reported that Kerry would be worried that his/her mother (48.5%), his/her father (47.8%) or he/she (41.5%) may ‘die’, that Kerry’s mother (42.7%) or father (43.4%) might ‘go away’, or that Kerry would be worried that he/she may be ‘left alone’ (39.5%).

Statistically significant gender differences were detected. More girls than boys reported that Kerry would feel not normal, frightened and sad, and worried that the house may burn and that Kerry’s mother or father may die. There was a non-significant trend of more boys thinking that Kerry would feel excited. There was no question which significantly more boys than girls affirmed.

Table 11.1:

*Imagined feelings of Kerry at the time of the bushfire by gender:
Affirmative responses to 'Kerry' Questions*

<i>Kerry would feel:</i>	<i>Total</i>	<i>Boys</i>	<i>Girls</i>	χ^2	<i>p</i>
	<i>N %</i>	<i>N %</i>	<i>N %</i>		
Not normal	217 74.5	102 70.4	115 81.0	4.40	<.05
Frightened	224 79.0	105 73.4	119 85.0	5.74	<.05
Sad	198 68.1	91 63.2	107 74.3	4.13	<.05
Excited	30 10.6	19 13.0	11 7.9	1.96	NS
Worried house burn	139 81.4	110 74.8	129 88.9	9.81	<.01
Mother may die	142 48.5	63 42.0	79 54.5	4.60	<.05
Father may die	139 47.8	59 40.7	80 54.0	5.24	<.05
He/she may die	122 41.5	54 36.2	68 47.2	3.63	NS
Mother may go away	126 42.7	60 40.3	66 44.0	0.42	NS
Father may go away	126 43.4	58 39.2	68 46.6	1.63	NS
He/she may be left alone	115 39.5	58 39.4	57 39.9	0.00	NS

Figure 11.1:

Percentage Children affirming Kerry questions 1-10 by Gender

Percent
of total
sample

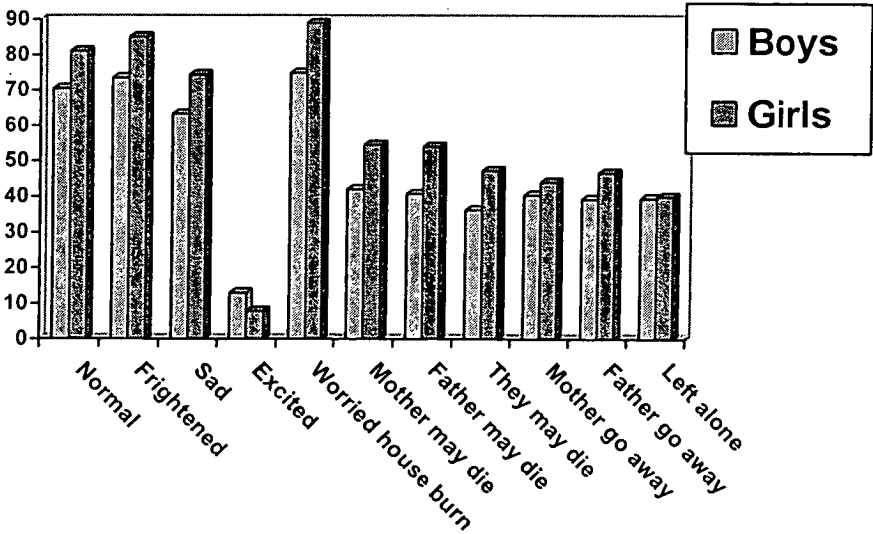


Table 11.2 summarizes the imagined feelings of Kerry “at the time of the bushfire” by school grade. Grade Three children significantly less often thought Kerry would feel normal during the fire scenario (10.7% versus 19.0% and 30.4%); rather Kerry would feel frightened (88.7% versus 76.6% and 80.4%). Grade One children significantly more often reported that Kerry would feel excited (20.2% versus 11.6% and 7.1%). Indeed, reporting that Kerry would feel excited was rarely affirmed (1.2%) by older children.

Table 11.2:

*Imagined Feelings of Kerry at the time of the bushfire by School Grade:
Affirmative responses to ‘Kerry’ Questions*

	<u>Grade</u>						χ^2	<i>p</i>
	<u>1</u>		<u>2</u>		<u>3</u>			
<i>Kerry would feel:</i>	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>		
Not normal	89	30.4	122	19.0	81	10.7	16.24	<.001
Frightened	85	80.4	121	76.6	82	88.7	14.32	<.001
Sad	88	59.8	123	66.2	82	67.6	0.87	NS
Excited	87	20.2	121	11.6	82	7.1	14.79	<.001
Worried house may burn	93	84.3	123	77.8	82	89.5	4.11	NS
Mother may die	96	61.3	124	52.3	80	49.7	0.96	NS
Father may die	95	62.2	123	51.0	81	47.9	0.69	NS
He/she may die	94	58.7	125	53.1	80	55.6	1.99	NS
Mother may go away	94	47.2	125	49.4	81	40.6	0.81	NS
Father may go away	96	50.0	127	46.8	82	41.5	0.21	NS
He/she may be left alone	98	45.5	126	45.3	82	47.6	5.92	NS

11.8.4 Responses to individual ‘Kerry’ Questionnaire items 11-20: “quite a long time after the fires”.

Table 11.3 summarizes the Infant School children's imagined feelings about Kerry, "now quite a long time after the fires". Despite the prompt, "It is now quite a long time after the fire", many children persisted in validating trauma-related answers for Kerry. Many children reported that Kerry would still 'experience scary dreams about the fire' (59.7%), 'think a lot about the fire' (51.7%), and would try 'not to think about the fire' (66.1%). There were fewer reports of Kerry experiencing headaches (38.6%) or stomach aches (36.8%). Many children reported that Kerry would still experience sleeping problems (48.7%). Although many children thought that Kerry would still feel 'scared' (33.6%), this proportion had dropped appreciably from the 79% who reported that Kerry would initially feel frightened. Many children felt that Kerry would still be upset if someone talked about the fire (53.8%).

Statistically significant gender differences were not found with the exception that more girls than boys imagined that Kerry would feel that the bushfire may happen again.

Table 11.3

*Imagined Feelings of 'Kerry' "quite a long time after the fire" by Gender:
Affirmative responses to Kerry Questions*

	<u>Total</u>		<u>Boys</u>		<u>Girls</u>		χ^2	<i>p</i>
<i>Kerry would feel</i>	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>		
Scary dreams about the fire	174	59.7	81	54.7	93	64.6	2.94	NS
Think a lot about the fire	151	51.7	78	52.7	73	49.6	0.27	NS
Tries not to think about fire	193	66.1	91	61.9	102	70.8	2.59	NS
Headaches	115	38.6	59	39.3	56	37.8	0.07	NS
Stomach aches	108	36.8	47	31.7	61	41.7	3.17	NS
Sleeping problems	145	48.7	72	48.0	73	49.6	0.08	NS
Scared	98	33.6	47	31.1	51	34.9	0.48	NS
Upset if someone talked about fire	158	53.8	73	50.0	85	57.8	2.31	NS
Feel may happen again	189	64.0	86	56.9	103	72.5	7.76	<.01

Similar to the findings on gender differences, when children imagined the feelings of Kerry a long time after the fires, the differences between grades were less prominent. There were significant differences among the three grades with respect to the proportions of children affirming that Kerry would be experiencing headaches (51.6% versus 34.6% and 30.5%; $\chi^2 = 9.80$, $p < .01$) and stomach aches (47.8% versus 34.6% and 28.4%; $\chi^2 = 7.47$, $p < .05$) and would be upset talking about the bushfires (60.2% versus 44.9% and 61.7%; $\chi^2 = 7.62$, $p < .05$). The results related to stomach aches and being upset talking about the bushfires could be type II errors given the number of tests (individual χ^2 test for each Kerry item) and the low obtained p values which were $p = .024$ and $p = .022$ respectively.

11.8.5 Total Kerry Questionnaire score.

Figure 11.3 depicts the distribution of Total Kerry Questionnaire Scores obtained by the Infant School children. The distribution appears relatively normal, meets a statistical test for normality (Kolmogorov-Smirnov₃₀₄ = 0.063, $p = 0.005$) and the observed values very closely align to the expected values for a normal distribution on a Normal Q-Q Plot (Figure 11.4).

Figure 11.2

Histogram of the Total Kerry Questionnaire Scores

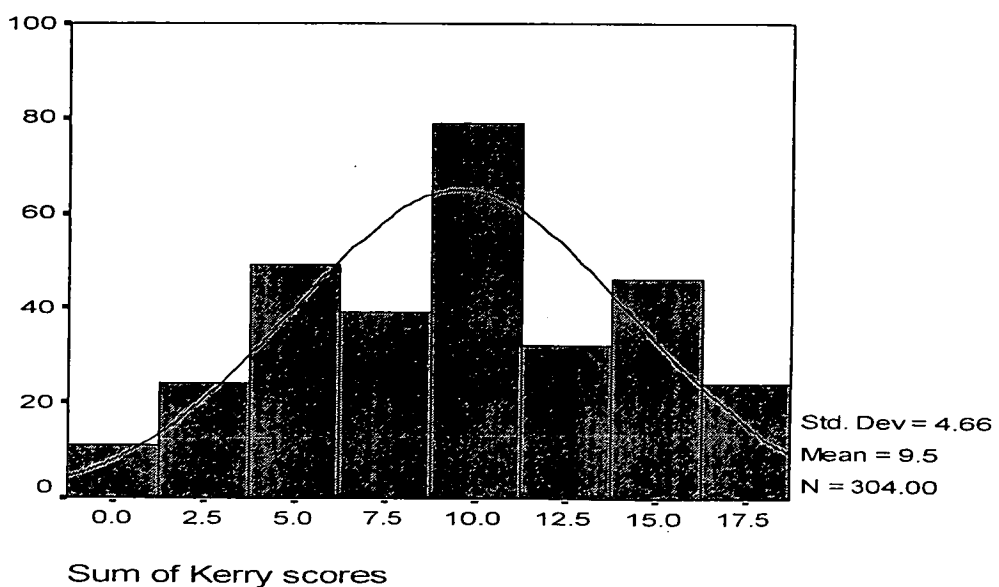


Figure 11.3
Normal Q-Q Plot of the Total Kerry Questionnaire Scores distribution.

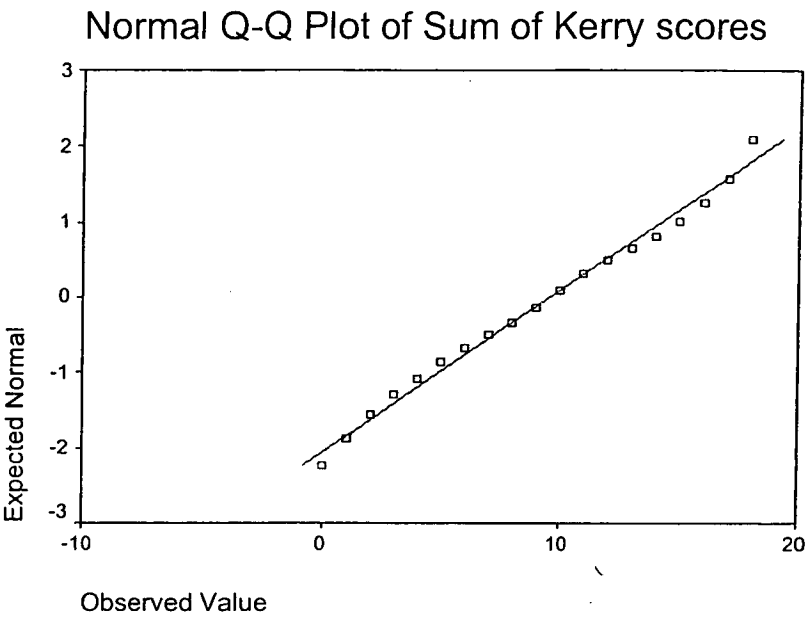


Table 11.5 summarizes Total Kerry Questionnaire Scores by gender stratified by school grade. There were no within grade gender differences.

Table 11.4
Total Kerry Questionnaire Scores by Gender and School Grade

<i>Total Kerry Questionnaire Scores</i>									
<i>Grade</i>	<i>N</i>	<i>Total</i>		<i>Boys</i>		<i>Girls</i>		<i>t</i>	<i>p</i>
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
1	95	9.56	4.98	9.63	4.79	9.34	5.16	0.27	NS
2	125	9.34	4.62	8.55	4.62	10.13	4.52	1.92	NS
3	82	10.06	4.19	9.15	4.26	10.86	4.19	1.78	NS
Total	302	9.60	4.62	9.06	4.59	10.13	4.62	1.96	<.05

There was no correlation between the Total Kerry Questionnaire Scores and age, $r = .039$, $p = \text{NS}$. There were no between grades differences in mean Total Kerry Questionnaire Scores, $F(1,3) = 0.653$, $p = \text{NS}$.

11.8.6 Total Kerry Questionnaire Scores and Infant School children's bushfire-related experience and perception of threat.

Table 11.5 summarizes the mean Total Kerry Questionnaire Scores and the parent-report of Infant School children's bushfire-related experiences and perception of threat. No statistically significant differences in mean Total Kerry Questionnaire Scores were found between groups of children who had and had not had specific bushfire experiences or perceived specific threats according to the parent-report measures.

Two further analyses of the child-report Total Kerry Questionnaire Scores and the parent-report of Infant School children's bushfire-related experiences and perceptions of threat were undertaken. An 8-question subscale of the Kerry questionnaire was created from the questions most closely representing DSM-IV PTSD symptoms. Questions included did Kerry: have scary dreams; think a lot about the fire; try not to think about the fire; feel the fire might happen again; get upset thinking about the fire; have sleeping problems; still feel scared; and think he/she may have died during the fire. However, no statistically significant differences were detected with respect to this subscale between those children who had and those who had not had specific bushfire experiences or perceived specific threats. Lastly, children who experienced bushfire-related evacuation and separation or who had increased threat perception did not affirm significantly more individual Kerry questionnaire items.

Table 11.5

Total Kerry Questionnaire Scores and Infant School children's bushfire-related experience and perception of threat.

<u>Mean Total Kerry Questionnaire Scores</u>							
<i>Experience</i>	<u>YES</u>		<u>NO</u>		<i>t</i>	<i>df</i>	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Home day of the fire	10.10	4.78	10.54	4.71	0.74	299	NS
Evacuation experience	10.30	4.54	10.67	4.83	0.55	190	NS
Child separation	9.92	4.81	10.29	4.80	0.59	306	NS
Separated at home	9.71	4.72	10.03	4.57	0.47	202	NS
Threat parent die	11.92	4.48	10.16	4.77	1.77	318	NS
Threat self die	11.26	4.59	10.15	4.78	0.88	306	NS

11.9 Discussion

The majority of children attributed a range of negative feeling states to Kerry at the time the bushfire. These included feeling generally abnormal, frightened and sad. A minority of children reported that Kerry would have felt excited. More girls than boys attributed negative feeling states to Kerry. More Grade Three than Grades One and Two children felt Kerry would not feel normal and would be frightened. More Grade One than Grades Two and Three children stated that Kerry would have felt excited. The majority of children were able to express concerns that their home would burn and approximately 50% of children expressed some concern about the threat of death to themselves or to their parents.

The persistence of feelings of emotional distress was evidenced by the fact that many children attributed symptoms to Kerry "quite a long time after the bushfire". Many

children reported that Kerry would remain scared about the bushfire, think about the bushfire a lot, try not to think about the bushfire, get upset if someone talked about the bushfire, and would experience sleeping difficulties and nightmares. The only statistically significant gender difference in the responses to these questions was that girls were more likely to feel that the bushfire might happen again. There were fewer statistically significant gender and school grade differences in the responses to the questions relating to “quite a long time after the bushfire”.

Analysis of the Total Kerry Questionnaire Scores identified a statistically significant gender difference, the girls scoring higher than the boys. There were no statistically significant differences in mean Total Scores among different age groups, across grades, or in relation to bushfire experiences such as evacuation or separation experience or perception of threat to parents and self.

The screening procedure experience and the subsequent analysis of the collected data supports the hypothesis that Infant School children can answer post-disaster questions in a yes/no format with some degree of validity. During the screening procedure the Infant School children sat quietly and diligently completed the questionnaire with low rates of missing data and very low rates of incorrect affirmation of both yes and no choices. However, further psychometric investigation of the Kerry questionnaire in relation to validity and reliability were outside the limits of this pilot study and this experimental design. Future research should investigate similarities and differences in responses when Infant School informants are asked about themselves and their own feelings, as opposed to the feelings of Kerry. Other developments should include investigation of instrument reliability: internal consistency, test-retest and inter-rater reliability. The latter investigating the difference in responses between children who experienced similar levels of disaster exposure and related phenomena. Validity testing should include concurrent validity with parent and teacher report and with formal individual psychiatric assessment. Predictive validity investigation could review the individual’s progress over time relating symptom maintenance or reduction and level of functional impairment with initial Kerry Questionnaire Score.

Girls scored significantly higher than boys on the Total Kerry Questionnaire Score

and on a number of individual questionnaire items. This is consistent with the findings from Primary School (Chapter 8) and High School (Chapter 9) samples using more sophisticated measures of emotional distress. Higher female symptom report is also consistent with the results of Shannon and colleagues following a hurricane disaster (1994) and the conclusions of the review of Green and colleagues (1991). This finding is not ubiquitous with no gender differences in symptom report published in more recent Australian bushfire research (McDermott, Lee, Judd & Gibbon, 2005). It should be noted that there is some evidence that this gender relationship does not hold if the disaster is war-related or involves significant civil unrest. Following these events gender equivalence has been reported (Pynoos, Frederick, Nader et al., 1987; Livingston, Lawson & Jones, 1993). Clinicians should be guarded in their conclusions about gender differences. Higher female symptom levels may be countered by other phenomena such as the possibility of lower help seeking behaviour for boys by their parents, or boys displaying post-disaster symptoms in other forms such as by exhibiting dysregulated behaviour.

Because of the limited age range in the Infant School sample it was predicted that there would be no statistically significant differences in emotional distress across age or school grades and this was confirmed.

The Total Kerry Questionnaire Scores, scores on the Kerry subscale that most coincided with DSM-IV PTSD symptoms and scores on individual Kerry questionnaire items were not significantly higher among children who had experienced an evacuation or separation during the bushfire. Similarly, those scores were not higher among those children who experienced a fear of dying or a fear about the potential death of a parent during the bushfire. This pattern of results does not coincide with the results obtained with the Impact of Event Scale (Horowitz, Wilner, & Alvarez, 1979) in Primary and High School samples of children who had experienced these bushfire factors and increased threat perception.

One possible conclusion from the failure to substantiate these hypotheses is that the explanatory model for emotional distress/PTSD in Infant School children is different to that in older Primary and High School children. Alternatively, the relative weight of distal and proximal aetiological factors is different in applying the existing model to Infant School children. These results suggest that factors external to the child are

of lesser importance to the younger age group. Factors intrinsic to the child would include their relative resilience and vulnerability; therefore measures of the child's temperament, attachment style, pre-disaster (trait) anxiety and past history of separation anxiety are likely to be important. The role of parental mental health and its implications for child psychopathology may prove to be important. In a case study of children involved in a motor vehicle accident parental emotional distress measured on the Impact of Event Scale was not correlated with child PTSD (McDermott & Cvitanovich, 2000). However, this study was exploratory and had a small sample size, thus the hypothesis should be further investigated.

A central issue in interpreting statistically significant findings is the differentiation between results which merely represent statistically significant associations and those which identify causality (Holford, 2002). Multivariate techniques used in chapters 8 and 9 allow for bivariate analysis whilst accounting for covariants and known confounding factors. These are powerful techniques in establishing causation as opposed to statistically significant associative factors. Whilst the size of the Infant School sample described in this chapter is sufficient to apply multivariate statistics, these techniques were not employed. The major outcome measure, the Kerry Questionnaire, is an instrument in the early stage of its development. As previously mentioned further psychometric investigation is required, such as test - retest reliability and a comparison of whether responses change if the individual is asked to directly report their own feelings. Given these caveats the findings reported in this chapter should be considered as statistically significant associations that warrant further investigation, rather than as evidence of causal relationships.

I

f a multivariate model including an Infant School sample was to be tested it would be unusual if the relative weight of causal factors or the range of causal factors would be the same for Infant, Primary and High School students. A principle of developmental theory is that novel patterns of individual functioning arise during individual ontology (Magnusson & Cairns, 1996). For example, it could be argued that younger children ("organisms" in general) are more reliant in framing their responses on external factors such as parents and the parent's own coping in response to the trauma. Interactive effects may be more important in a multivariate understanding of Infant School children's responses. In the relationship between age

and emotional distress, for example in the adolescent group, the effect of differential bushfire exposure is accounted for in the multivariate analysis. This is important given adolescents may have absented themselves from the disaster 'zone', possibly days before. In the bivariate analysis reported in this chapter evacuation experience was not associated with higher total Kerry score for Infant School children. However, the evacuation experience of Infant School children may be qualitatively different to that of older children due to a greater maintenance of proximity to the primary attachment figure leading to this variable being a less powerful aetiological factor for subsequent emotional distress.

Consistent with another developmental principal, that of the inter-related influence of a range of developmental subsystems (Magnusson & Cairns, 1996) including the neurobiological system, differences would again be predicted across the developmental span. A neurobiological example is the rapid increase in the number of central nervous system synapses during phase 3 synaptogenesis with maximal activity around birth, followed by a long plateau of synaptic plasticity until puberty (Bourgeois, 2001). Does increased neural plasticity confer resilience to the adverse sequelae of traumatic events? Or is the opposite possible: severe early trauma may lead to dysfunction across several subsystems including the neurobiological, autonomic nervous system (fixed autonomic arousal), and to the creation of dysfunctional schemata that may adversely affect the individual's developmental trajectory over time.

Further research is recommended across the full range of subsystems implicated, including biological changes in traumatized younger children, cognitive changes, the influence of parent functioning including parent PTSD and depression, and socio-cultural influences and effects such as the role of peers and school. Differences in risk factors and outcomes should be expected across the infant, child and adolescent developmental ranges.

of lesser importance to the younger age group. Factors intrinsic to the child would include their relative resilience and vulnerability; therefore measures of the child's temperament, attachment style, pre-disaster (trait) anxiety and past history of separation anxiety are likely to be important. The role of parental mental health and its implications for child psychopathology may prove to be important. In a case study of children involved in a motor vehicle accident parental emotional distress measured on the Impact of Event Scale was not correlated with child PTSD (McDermott & Cvitanovich, 2000). However, this study was exploratory and had a small sample size, thus the hypothesis should be further investigated.

A central issue in interpreting statistically significant findings is the differentiation between results which merely represent statistically significant associations and those which identify causality (Holford, 2002). Multivariate techniques used in chapters 8 and 9 allow for bivariate analysis whilst accounting for covariants and known confounding factors. These are powerful techniques in establishing causation as opposed to statistically significant associative factors. Whilst the size of the Infant School sample described in this chapter is sufficient to apply multivariate statistics, these techniques were not employed. The major outcome measure, the Kerry Questionnaire, is an instrument in the early stage of its development. As previously mentioned further psychometric investigation is required, such as test - retest reliability and a comparison of whether responses change if the individual is asked to directly report their own feelings. Given these caveats the findings reported in this chapter should be considered as statistically significant associations that warrant further investigation, rather than as evidence of causal relationships.

I

f a multivariate model including an Infant School sample was to be tested it would be unusual if the relative weight of causal factors or the range of causal factors would be the same for Infant, Primary and High School students. A principle of developmental theory is that novel patterns of individual functioning arise during individual ontology (Magnusson & Cairns, 1996). For example, it could be argued that younger children ("organisms" in general) are more reliant in framing their responses on external factors such as parents and the parent's own coping in response to the trauma. Interactive effects may be more important in a multivariate understanding of Infant School children's responses. In the relationship between age

and emotional distress, for example in the adolescent group, the effect of differential bushfire exposure is accounted for in the multivariate analysis. This is important given adolescents may have absented themselves from the disaster 'zone', possibly days before. In the bivariate analysis reported in this chapter evacuation experience was not associated with higher total Kerry score for Infant School children. However, the evacuation experience of Infant School children may be qualitatively different to that of older children due to a greater maintenance of proximity to the primary attachment figure leading to this variable being a less powerful aetiological factor for subsequent emotional distress.

Consistent with another developmental principal, that of the inter-related influence of a range of developmental subsystems (Magnusson & Cairns, 1996) including the neurobiological system, differences would again be predicted across the developmental span. A neurobiological example is the rapid increase in the number of central nervous system synapses during phase 3 synaptogenesis with maximal activity around birth, followed by a long plateau of synaptic plasticity until puberty (Bourgeois, 2001). Does increased neural plasticity confer resilience to the adverse sequelae of traumatic events? Or is the opposite possible: severe early trauma may lead to dysfunction across several subsystems including the neurobiological, autonomic nervous system (fixed autonomic arousal), and to the creation of dysfunctional schemata that may adversely affect the individual's developmental trajectory over time.

Further research is recommended across the full range of subsystems implicated, including biological changes in traumatized younger children, cognitive changes, the influence of parent functioning including parent PTSD and depression, and socio-cultural influences and effects such as the role of peers and school. Differences in risk factors and outcomes should be expected across the infant, child and adolescent developmental ranges.

CHAPTER 12

ANALYSIS V

SPECIFIC GROUPS: PARENT - INFANT SCHOOL CHILDREN

CONCORDANCE OF SYMPTOMS

12.0 Summary

Parents report significantly fewer post-disaster symptoms in Infant School children than do the children themselves. Concordance of symptom report is low, even comparing similar questions on the parent- and child-report checklists. However, there were significantly higher mean parent-report checklist scores for Infant School children who experienced evacuation, separation or higher bushfire-related threat perceptions than for those children who did not share such experiences or perceptions. This finding is similar to the statistically significant findings obtained from a multivariate analysis of Primary and High School students' self-reports. Discussion includes issues of methodology, possible future research directions and service provision implications.

12.1 Introduction

The clinical assessment of possible Post Traumatic Stress Disorder (PTSD) presentations during childhood typically involves a review of the family as a whole, or of parents and child alone or in various combinations. This reflects the potential range of informants' reports used in child and adolescent mental health assessment and diagnosis. Child reports were once validated against parent reports, with the mother seen as the best source of information. More recently, the importance of interviewing the child has been acknowledged (Hodges, Gordon, & Lennon, 1990; Welner, Reich, Herjanic, Jung, & Amado, 1987). Clinical practice has been influenced by research findings which indicate that parents report more behavioural problems and children more internalizing symptoms (Edelbrock, Costello, Dulcan, Conover, & Kaka 1986; Herjanic & Reich, 1982; Hodges, Gordon & Lennon, 1990; Rey, Schrader, & Morris-Yates, 1992). It has now become accepted practice to obtain information from multiple sources (Offord, et al., 1996), the content of each report contributing to the clinical judgment of the severity of psychopathology (Verhulst & Van der Ende, 1991).

The use of multiple informants in structured psychiatric interviews with children and adolescents has been marked by poor concordance of ratings between different informants. Child and parent ratings of psychiatric symptoms typically demonstrate low to moderate agreement (Achenbach, McConaughy & Howell, 1987; Boyle, et al., 1993; Edelbrock et al., 1986; Ivens & Rehm, 1988), the average correlation between child and parent ratings being $r = .25$ (Achenbach, McConaughy, & Howell, 1987).

A robust research finding is that closer parent-child concordance is reported for observable (i.e., externalizing) behaviours than for subjective experiences and internalizing symptoms (Achenbach et al., 1987). This holds for dimensional approaches using instruments such as the Child Behavior Checklist and Youth Self-Report (Rey, Schrader, & Morris-Yates, 1992; Verhulst & van der Ende, 1991) as well as for measures that assign respondents to a diagnostic category, such as the Child Assessment Schedule (Hodges, Gordon & Lennon, 1990), the Diagnostic Interview Schedule for Children (Edelbrock et al, 1986), and the structured diagnostic interview (Herjanic, Herjanic, Brown & Wheatt, 1975; Herjanic & Reich, 1982).

Parent-child concordance varies with age, suggesting a developmental component. A meta-analysis of 119 studies of cross-informant rating of child and

adolescent behavioural and emotional problems revealed higher concordance between parents and children than between parents and adolescents (Achenbach et al., 1987). Rey, Schrader, and Morris-Yates (1992) reviewed the literature on possible reasons for the low concordance of parent-child measures. Suggested reasons included poor informants, unreliable measures, different contexts for observing behaviour, informants' mental state, and informants' errors and mistakes. In addition individual items included in measurement instruments may be ambiguous, require inferences to be made, or require threshold judgements. Rowe and Kandel (1997) estimated that parental ratings of child psychopathology include a 21% to 50% "individual view" component, representing the proportion of variance attributable to the parent's unique perception of the child. In summary, the literature on parent-child concordance to date suggests that low to moderate parent-child concordance on structured assessment interviews is the norm, with moderate agreement on reports of externalizing behaviour and low agreement on reports of internalizing symptoms. Whilst investigated in less detail there is some evidence of decreasing levels of parent-child concordance with increasing age of the child raters.

12.2 Hypotheses

Hypotheses relating to Infant School students are summarized in sections 5.2.3(a) and 5.2.3(b). Hypotheses relating to parent-child concordance of post-disaster child distress symptoms include:

- 1 Parents will report significantly more externalizing symptoms, for example behaviour change and nightmares, in their children than will the children themselves.
2. Parents will report significantly more symptoms for girls.
3. There will be significant differences in parent-report symptom counts between age and school grade groups

4. There will be a statistically significant concordance between similar items on the parent-report child symptom checklist and the child-report Kerry questionnaire.

5. There will be a statistically significant concordance between the total symptom count on the parent-report child symptom checklist and the total score of the child-report Kerry questionnaire.

6. Children who experienced bushfire related evacuation or separation will score significantly higher on the parent-report child symptom checklist items.

7. Children who experienced bushfire related perception of threat to themselves or their parents will score significantly higher on the parent-report child symptom checklist items.

8. Children who experienced bushfire related evacuation, separation or higher perception of threat will score significantly higher on the total parent-report child symptom checklist score.

12.3 Method

Overall SBTP methodological issues are discussed in depth in chapter 6. A discussion on screening in child and adolescent mental health is included in section 4.4. Deviations from the SBTP screening protocol as applied to Infant School children are discussed in section 11.3.

12.4 Measures

Two sources of data are used in this analysis. The child-report Kelly questionnaire is described in section 11.3. Parent-report data collected from all parents of Primary School children are reported in section 6.6.1 and Table 6.2.

A post-bushfire disaster child symptom checklist was employed to collect additional information from the parents of the Infant School children. The checklist comprised seven statements, each followed by a YES/NO response field. The checklist included an introductory statement, “During the last six months did your child”, followed by the seven questions: “experienced nightmares?”, “appeared suddenly frightened?”, “have sleeping problems?”, “be more irritable?”, “have regressed (baby-like) behaviour?”, “appear suddenly anxious?”, and “have fire-related or disaster-related play?”.

The number and complexity of these questions was determined by the Ethics Committee stipulation that data collection from parents must not be onerous and by the requirement that the parent-report questionnaires had to fit on the reverse side of the A4 consent form see section 6.5.1.

12.5 Participants

A total of 447 Infant school students aged from 5 to 9 years, ($M = 7.03$, $SD = 0.91$) was screened with this procedure. The children were distributed across the three school grades, the number of children per grade varying from 133 to 162. Female students comprised 53% of the sample.

12.6 Statistical analysis

The collection and analysis of parent information, such as bushfire-related factors, was identical to the primary school student sample and discussed in detail in chapter 6. Gender was analysed as a nominal covariate. School attended was analysed

as a factored (nominal) covariate. The Kerry questionnaire items were analysed as individual nominal variables. Age and the overall emotional distress score, which was obtained by summing the 20 Kerry questionnaire items, were analysed as continuous variables. Parent-report child symptom checklist items were analysed as individual nominal variables. The total parent-report child symptom checklist score was analysed as an ordinal variable or transformed into a nominal (i.e., no symptoms versus any symptoms) variable. Transformations are described in the appropriate section of the Results. Statistical significance was set at the .05 level. To decrease the possibility of type 1 errors only analysis of a priori hypotheses rather than 'automatic' testing of multiple variables were performed, as well as report of associations with p values in the range .01 to .001. When significant associations are reported at the .05 level the evidence for rejecting the null hypothesis for these associations is less strong.

12.7 Results

12.7.1 Parent-report of child symptoms

Parents infrequently affirmed any of the seven symptoms on the parent-report checklist (Figure 12.1). Of the 19.1% of parents who checked at least one symptom, the most common symptom was a child suddenly appearing anxious (10.8% of all parents) followed by: sleep problems (6.8%), regressed behaviour (5.9%), irritability (5.4%), nightmares (4.8%), suddenly appearing frightened (3.6%) and post-traumatic play (1.8%).

The most frequent number of checklist symptoms affirmed was one symptom (41 parents, or 47.7% of those who affirmed any child symptom), followed by two symptoms (22.1%) or three symptoms (17.4%). It was uncommon to affirm more than three symptoms (12.8% or 2.4% of all parents); one parent checked all seven symptoms.

Table 12.1 summarises the parent-report child symptom checklist individual items by the child's gender. There were no statistically significant gender differences. Table 12.2 summarises the parent-report child symptom checklist individual items by school grade. There were no statistically significant school grade differences.

The parent-report child symptom checklist total score (range 0 – 7) was also analysed for differences across gender, age and school grade. There were no statistically significant differences in parent-report child symptom checklist mean scores across gender ($t(445) = -1.25, p = \text{NS}$); school grade ($F(3) = 0.19, p = \text{NS}$); or age ($F(4) = 1.789, p = \text{NS}$).

Figure 12.1
Bar Graph of Parent Symptom Checklist

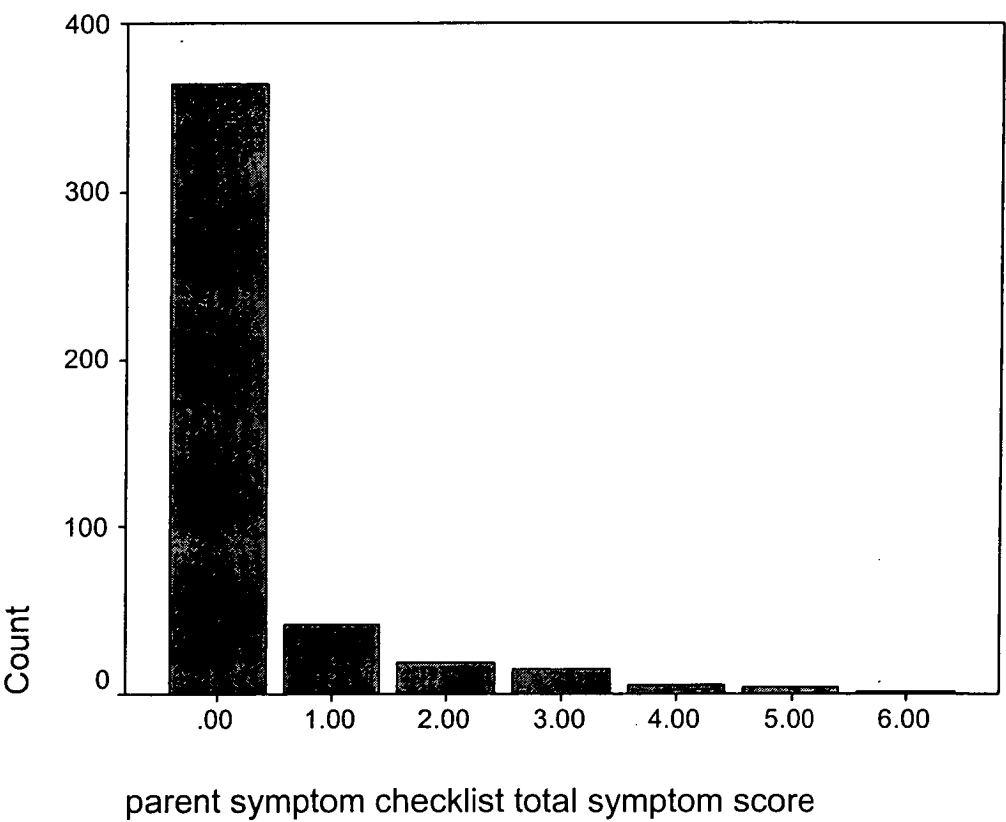


Table 12.1

Parent-report of Symptoms in Infant School children by Gender: Questions affirmed by Parents.

	<u>Total</u>		<u>Boys</u>		<u>Girls</u>		χ^2	<i>p</i>
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%		
Nightmares	21	4.8	9	4.5	12	5.6	0.17	NS
Suddenly frightened	16	3.6	4	2.0	12	5.4	3.16	NS
Sleep problems	30	6.8	10	5.1	20	9.3	2.35	NS
Suddenly irritable	24	5.4	13	6.6	11	5.0	0.48	NS
Regressed behaviour	26	5.9	11	5.6	15	6.8	0.21	NS
Suddenly anxious	48	10.8	17	9.0	31	15.3	2.81	NS
Post-traumatic play	8	1.8	4	2.0	4	1.7	0.03	NS

Table 12.2

Parent-report of Symptoms in Infant School children by School Grade: Questions affirmed by Parents.

	<u>Grade</u>			H^a	<i>p</i>
	<u>I</u>	<u>II</u>	<u>III</u>		
	<i>N rank</i>	<i>N rank</i>	<i>N rank</i>		
Nightmares	131 217.5	159 219.6	142 212.1	2.04	NS
Suddenly frightened	131 212.4	157 214.3	142 216.6	2.32	NS
Sleep problems	132 220.5	158 213.5	143 217.6	1.25	NS
Suddenly irritable	132 213.7	159 220.5	142 216.2	1.46	NS
Regressed behaviour	133 219.7	158 217.4	143 215.6	0.44	NS
Suddenly anxious	132 212.0	159 218.5	142 219.9	1.08	NS
Post-traumatic play	131 215.3	157 216.5	143 216.5	0.12	NS

a Non parametric Kruskal-Wallis (H) Test.

12.7.2 Parent – Child Symptom Concordance

Several items on the parent-report child symptom checklist were identical too or closely resembled child-report questions on the Kerry questionnaire. For example, both scales asked about “sleeping problems”. Table 12.3 summarises the report of parents and children on these similar items, analysed with a series of 2 x 2 tables and χ^2 tests. The child-report rate on these items was in each case greater than the parent-report rate, the magnitude varied by item, the ratio ranged from approximately 2 to 15. There was no statistically significant concordance between the parent- and child-reported items.

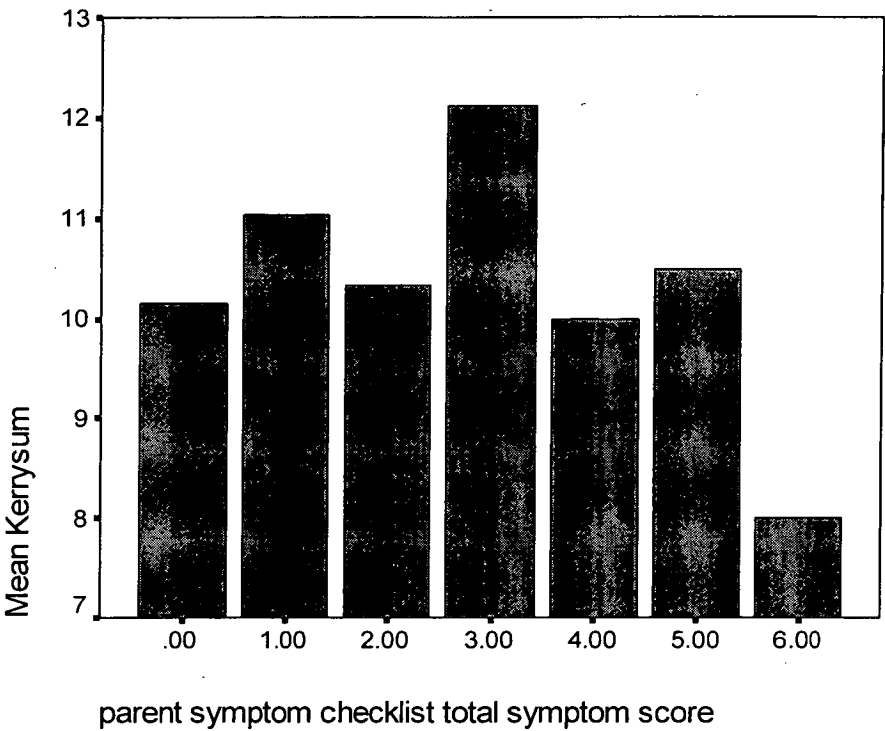
Table 12.3

Concordance of Parent-report items on the child symptom checklist and child-report items on the Kelly Questionnaire

<u>Parent-report (a)</u>	<u>Child-report (b)</u>	<u>(a)</u>		<u>(b)</u>		χ^2	p
		N	(%)	N	(%)		
‘Nightmares’	‘Scary dreams’	21	4.8	174	59.7	2.29	NS
‘Suddenly frightened’	‘Frightened’	15	3.6	224	79.0	1.19	NS
‘Suddenly frightened’	‘Scared’	16	3.6	98	33.6	2.65	NS
‘Sleep problems’	‘Sleep problems’	30	6.8	145	48.2	2.65	NS
‘Anxious’	‘Scared’	48	10.8	98	33.6	1.22	NS

Figure 12.2

Bar chart of Child-report KERRYSUM score (mean) by the parent-report child symptom checklist



12.7.3 Comparison of Parent-report of bushfire-related experiences of Infant School children and Primary School children

Table 12.4 summarizes the bushfire-related experiences of Infant School children with comparison data from Primary School children (see chapter 8). The majority of Infant School children were at home on the day of the bushfire (70.6%) and at some point during the day more than half the children were evacuated from their home (53.6%). Some Infant School children did experience separation from their parents on the bushfire disaster day (28.4%) whilst many children separated from their parents

were at home (41.3%) and in potential danger. These events were not mutually exclusive; a child could experience a period of separation at home and later be evacuated. Some children stated to their parents that they were concerned that they would die (5.9%) or that their parents would die (8.1%).

There was no statistically significant difference in the proportions of Infant School and Primary School children who were at home on the day of the fire, separated from their parents or who experienced threat perception to themselves or their parents. However, statistically significantly more Infant School than Primary School children were separated and at home, and evacuated, on the day of the fire

Table 12.4

Bushfire-related experience of Infant school children with comparison data from Primary age children

<u>Experience or Perception</u>	<u>Infant</u>		<u>Primary</u>		χ^2	<i>p</i>
	<i>N</i>	%	<i>N</i>	%		
At home on day of fire	288	70.6	307	67.5	0.97	NS
Evacuation experience	142	53.6	158	35.7	21.80	.000
Separation from parent	119	28.4	154	33.8	3.01	NS
Separation and at home	116	41.3	134	29.4	10.84	.001
Parent(s) may die	35	8.1	39	9.5	0.55	NS
Self may die	25	5.9	23	5.6	0.03	NS

12.7.4 The relationship of bushfire-related experiences and threat perception and parent-report of child symptoms.

Table 12.5 summarizes the parent-report child symptom checklist scores, transformed into a categorical variable (No symptom, 1 or more symptoms) and the child's bushfire experience and threat perception. There was no statistically significant

difference in parent-report of child symptoms in children at home on the day of the bushfire compared to those who were not at home. There were statistically significant differences in parent-report symptoms between children who had experienced an evacuation, or separation from parents or who perceived the bushfire as potentially life-threatening to themselves or to their parents and those children who had not had such experiences or perceptions.

Table 12.5
Bushfire-related experiences and threat perception and parent-report of child symptom

<i>Parent-report child symptom checklist</i>					
<i><u>Affirmed experience</u></i>					
<i><u>/perception</u></i>	<i><u>NO</u></i>	<i><u>YES</u></i>	χ^2	<i>p</i>	
At home on day of fire	236 69.2	59 77.6	2.13	NS	
Evacuation experience	104 49.1	40 68.9	7.25	.007	
Separation from parent	75 21.7	47 56.6	39.95	.000	
Separation and at home	79 35.1	40 64.5	17.31	.000	
Parent(s) may die	11 3.1	26 31.3	70.19	.000	
Self may die	9 2.6	17 20.7	38.19	.000	

12.7 Discussion

Compared to the Primary School children a similar proportion of Infant School children were at home on the day of the bushfire. A greater proportion of

Infant School children were evacuated, possibility indicating parents' greater concern about the vulnerability and safety of younger children. Equal numbers of Infant and Primary School children were separated from their parents on the day of the bushfire. Surprisingly, significantly more younger children than older children were separated from their parents whilst at home. A possible explanation for this is that the older Primary School children were separated from their parents because they were visiting other similar age friends.

Parents reported considerably less post-disaster symptoms than children, even when only considering parent-report and child-report items that were similar across the two questionnaires. This may be due to methodological limitations of the Kerry Questionnaire which may not truly reflect the emotional state of Infant School children. However, this finding is consistent with past research findings: given PTSD is classified under the anxiety - internalizing rubric children are able to report more internalizing symptoms than parents are able to observe (Achenbach et al., 1987; Verhulst & van de Ende, 1991). A reporting factor that may be unique in the emotional trauma field is children's reticence to discuss their negative feeling states and emotional distress with their parents (Stallard & Law, 1994), so as not to burden their parents with further worries (Yule, 1992). If parents did report symptoms it was most usually between one and three symptoms, the commonest reported symptom being that the child suddenly appeared anxious. The number of parent reported symptoms did not significantly differ across age or gender groups.

Parent - child symptom concordance, most likely to be high in the similarly worded parent-report and child-report questionnaire items, was not found to be statistically significant. This may be an argument for ascribing a low priority to asking parents about their child's psychopathology in the post-disaster environment. However, parent-report of the number of child symptoms was significantly higher in Infant School children who experienced evacuation or separation from their parents during the bushfire and in children who expressed fear death of their parents or of themselves than in those who had not shared those experiences or perceptions. These findings are similar to the findings for Primary School children (chapters 8 & 9) who self-reported increased emotional distress as measured by the Impact of Event Scale (Horowitz, Wilner & Alvarez, 1979).

An important methodological caveat alluded to above, is the quality of data from the pilot Kerry Questionnaire. As discussed in chapter 11 the psychometric

properties of the Kerry Questionnaire including the scale's reliability and validity has not been established. Further, the postulate that asking children about Kerry and expecting answers that reflect their own mental state has not been empirically tested. Accordingly, the low level of parent-child concordance reported in this chapter should be treated as only indicative and requiring considerable further investigation.

With the above caveat, an issue in understanding the statistically significant findings is whether they identify associations or causal factors. If, for instance, parents were concerned about the psychological implications of their child experiencing an evacuation or separation during the bushfire disaster, they may also have been more vigilant about possible post-disaster emotional distress symptoms. This introduces a potential systematic reporting bias, as parents were the source of both the bushfire-related information and the parent-report child symptom checklist data. The same argument holds that if a child stated to their parent that they thought they may have died during the bushfire the parent may have been more vigilant for signs of emotional distress in the child. Alternatively, factors such as evacuation and separation experience and perception of threat may be causal in the subsequent development of emotional distress in Infant School children (see section 11.9 for further discussion of this issue). If this was so then the statistically significantly higher parent-report of child symptoms in children experiencing these factors is evidence that parents were identifying distressed children, albeit an under-report given the rate of identification.

Further developments, along with further testing of the Kerry Questionnaire, should include how other aspects of the developmental model impinge upon parent-child symptom concordance. It is postulated that family resources impinge upon a child's outcome. Such factors include whether the child is from a single parent family, the socioeconomic status of the family and the availability of extended family or friendship networks to assist in times of stress. Of particular interest is the possibility that parent report is influenced by the parents' own post-disaster mental health with either parent depression or PTSD potentially providing a barrier to identifying adverse mental health in the child. Similarly, there are societal views about emotional trauma, potentially held by the parent that may also confer a barrier to child case identification. These views include beliefs that children are too young to experience emotional trauma, that children are innately resilient, that 'time alone' is curative and talking about traumatic events will 'make matters worse' (akin to 'let sleeping dogs lye') or will 'stir up' issues.

From a service provision perspective, based on the findings of this analysis and the measures used, parent report measures of post-disaster symptoms in Infant School children requires substantially more development to be useful in a valid screening strategy. Consistent with current literature on general child psychopathology, post-disaster parent report measures should emphasize the child's behavioural change in the post-disaster environment. A range of informants would also be necessary including an emphasis on Infant School children's self-report of their post-disaster emotional state.

CHAPTER 13

THE BUSHFIRE AND ME. **A GUIDED WORKBOOK FOR** **CHILDREN WITH BUSHFIRE** **RELATED PTSD: RESOURCE** **PRINCIPLES AND PILOT** **EVALUATION**

13.1 Introduction

It has already been discussed that mass screening is justifiable if matched with an acceptable, economically viable and effective treatment, see chapters 4 and 6 for a more detailed discussion of screening in child and adolescent mental health. Pre-screening projections of the likely numbers of emotionally distressed children requiring therapy strongly suggested individual therapy with experienced PTSD counselors was not a viable option in the post-bushfire disaster environment. Available data at the time of the SBTP indicated that prior to the bushfire disaster Child and Youth Mental Health Services had significant waiting lists, for some individuals a wait of several months before an initial mental health assessment. Research since the bushfires has clarified that even in a country well resourced with mental health services, of those individuals who could benefit from a mental health intervention more children do not receive such help than do (see chapter 1; Zubrick,

Silburn, Garton, Dalby, Carlton, Shepherd, Lawrence, & Burton, 1995; Sawyer, Kosky, Graetz, Arney, Zubrick, & Baghurst, 2001). Two interventions were considered suitable in the post-disaster environment based on the SBTP steering committee's opinion of acceptability with parents and counselors, economic acceptability and consistent with current therapeutic practice. Younger children, both in Infant school (age 5-8 years) and Primary School (ages 9-11 years) used the guided therapy manual, *The Bushfire and Me: A Story of What happened to Me and My Family* (Storm, McDermott, & Finlayson, 1994). High School children were offered a group therapy program.

13.2 Principles underpinning SBTP Intervention Resources.

Similar therapy principles guided the development of each resource. Overarching concerns were the need to be developmentally appropriate, especially the communication style of children at different developmental stages. Given the professional background of the authors of the workbook was varied, both dynamic and cognitive-behavioural theory, the latter including information processing theory (Chemtob, Roitblat, Hamada, Carlson, & Twentyman, 1988; Resick & Schnicke, 1992), influenced the workbook.

Information processing theory states that there is the potential of being overwhelmed by the everyday volume of information requiring processing. To counter this, information is encoded and recalled in specific ways. Cognitive schemata are developed as a primary organizing heuristic. A schema is a "generic stored body of information that interacts with incoming information" (Resick & Schnicke, 1993, p. 10). The schema - incoming information process influences subsequent memory encoding and retrieval. It is postulated that trauma-related information is also encoded with relation to existing schema. Dissonance with existing schema leads to conflict and the disruption of usual memory encoding, comprehension and memory retrieval sequence, the greater the dissonance, the greater the likelihood of trauma symptoms and impairment.

One postulate is that there are very specific schema that if violated are more likely to precipitate trauma symptoms. Just-world beliefs (Lerner & Miller, 1978),

paraphrased as ‘good things happen to good people’ may be radically undermined after a traumatic event such as the experience of being raped. Possible psychological responses to information dissonant to existing schema include processes of assimilation and accommodation of this information. In assimilation the “information is altered or distorted to fit into existing schema” (Resick & Schnicke, 1993, p. 12). To accommodate the new information the individual needs to change their existing schemata to account for and accept the new information. The latter may facilitate recovery. Unfortunately accommodation may create a secondary impairment if, for instance, new schema are punitive, self-deprecatory, undermine adaptive beliefs about safety or intimacy and make the tasks of daily living more difficult. Child and adolescent trauma complications can be more complex given the added possibility of altered parent schema about their child’s safety. An example is the double jeopardy of the child who experienced a type I sexual trauma (a paroxysmal, unitary event rather than serial sexual abuse). Such an event may lead to trauma-related psychopathology. If, for a protracted period thereafter, altered parent-child safety schema lead to the child not being allowed to visit friends, go on school outings, ‘sleep-overs’ and other events without direct parent monitoring, the normal process of child-adolescent individuation-separation may be retarded generating a secondary impairment.

It was postulated that following the disaster children would experience difficulties in both the assimilation and accommodation of schema-dissonant information. In young children this may be manifest as self-blame for the disaster, heightened by a child’s tendency to regress to a more egocentric worldview. Accommodation difficulties may be manifest by schema suggesting ongoing extreme danger, either to themselves, friends or family from future disastrous events. Other changed schema may be that the bushfire disaster will re-occur each summer, the bushfire disaster will become greater with a larger disaster-affected area and parents and other adults cannot protect children from natural disasters. It was postulated that examples of assimilation may be considering personal, parent, school or community under-preparation was responsible for the disaster or that ‘no-one cares’ for children or individuals who have experienced the disaster. These possible examples of post-disaster cognitive accommodation and assimilation were included in the therapy workbook and are discussed further in the following section.

An important caveat in the use of both the guided workbook and the adolescent

group program was that these resources were not designed to replace either the therapist or parent. Rather, the usual post-trauma emotional resources provided by intuitive parents to secure attached children was promoted by the workbook containing parent sections and the ability of parents to be engaged in many workbook activities. These elements were not as prominent for adolescents attending the group program. However, less involvement of the parents of adolescents is consistent with the adolescent's wish for greater autonomy and separation during this developmental stage. The workbook also did not attempt to make obsolete the child mental health therapist or school counselor. Integration with other therapy was a goal of using the workbook, promoted by each child's workbook being reviewed by a mental health professional at the end of every completed chapter. Further, both the workbook and group therapy were not seen as the only post-disaster therapy available. Parents, teachers and mental health professionals were encouraged to identify children with either unremitting symptoms or persistent impairment for whom a more intensive and individualized treatment would be appropriate.

13.3 The Bushfire and Me

There is a long tradition in child and adolescent mental health therapy of employing age appropriate means of communication with children including creative expression in art, music and play. Established therapeutic communication strategies for children are typified by Winnicott's Squiggle Game (Winnicott, 1971) and the use of drawings and play with traumatized children (Pynoos & Eth, 1986). The guided workbook format facilitated the inclusion of pictures, drawings, cartoons, activity instructions and much free space.

The guided workbook contained three sections. The introductory and final sections were primarily for parents and caregivers. These sections included factual information about the bushfire disaster and psychoeducational information summarizing the range of typical emotional responses exhibited by children after such a traumatic event. Factual information was designed to counter the tendency to cognitively distort bushfire related events: 800,000 hectares of land burnt, not 8 million; 206 houses were destroyed not 2000. Descriptions of typical child emotions provided normative information about the many post-disaster distressed states of

children and gave parents a yardstick for when the persistence of such states increased the likelihood of a clinically significant anxiety or depressive state. This information was operationalised into guidelines for indicating when some children warranted a psychological intervention whilst others did not.

The largest section of the book was primarily for children. The section began by introducing the reader to several cartoon characters who personified groups of individuals, such as firefighters, who were prominent during or after Australian bushfire disasters. Cartoon characters included 'Fire-fighting Pos' (possum), 'Reporter Roo' (kangaroo), 'Comfort Koala', and 'Counseling Eagle'. These characters were featured throughout the workbook: asking questions, making suggestions, describing possible activities or presenting 'Fact Boxes'.

The overall structure of the workbook was a chronological narrative from the pre-disaster period of normality, to pre-disaster apprehension, the actual disaster, and the post-disaster aftermath and transition points following the disaster. The latter included volunteer firefighters returning to their homes, children returning to school, re-establishing school, family and neighborhood routines, rebuilding homes and infrastructure, return of vegetation and anniversary reactions. Chapter 1, focused on biographical details of the child and practice for the child using the workbook. No task in chapter 1 was designed to trigger disaster-related schema or PTSD re-experiencing phenomena. Rather, chapter 1 was conceptualized as a gentle introduction to this type of therapy. Chapter 2 'Before the Bushfires', reminded individuals that their life did not begin after the traumatic event. Chapters 3, 'The Fire Came' and 4 'After the Bushfires' promoted intense re-experiencing of the traumatic event. Re-experiencing prompts and tasks were broad including trauma-related thoughts, feelings and perceptions that may have been prominent during the disaster. Chapter 5, 'People Who Helped', emphasized positive volunteer and professional involvement in combating the disaster and assisting with recovery. Chapter 6, 'Back to School', allowed children to share feelings and stories with friends, teachers and others. Feelings of isolation or loneliness were discouraged. The random nature of traumatic events was highlighted. An emphasis was also placed on normalizing negative feeling states and post-disaster psychopathology, and helping the child share these feelings with parents and others. Chapter 7, 'Several Months Later', focused on wider community and ecological recovery. Chapter 8, 'One Year Later', dealt with the potentially distressing anniversary reactions and

heightened feelings of disaster-related mastery in the form of active preparation for the ensuing summer bushfire season.

The adolescent group program was 6, 2-hour sessions with groups of 6 to 8 students and two therapists. The introduction session comprised meeting participants and leaders and sharing expectations. Subsequent sessions included elements of trauma re-exposure and testimony with other group participants, psychoeducation including normalizing emotional and behavioral changes since the bushfire and skills acquisition. The latter included relaxation techniques, identifying and challenging unhelpful schemata and cognitions that had developed since the disaster and gaining mastery by problem solving and preparedness for future bushfire seasons.

13.4 Treatment Effectiveness

The SBTP was not designed or intended as a treatment effectiveness research project, rather, post-disaster mass screening was employed as a service provision strategy to then enable a targeted intervention with the two therapies described. The Australian National Mental Health Plan (1998) stipulates the necessity for treatment evaluation and outcome measurement. The implementation of best practice treatment outcome research in the post-disaster environment presents inherent difficulties. Research is often attempted in systems such as the school and non-government and voluntary organisations that are commonly without a tradition of rigorous service evaluation. In the post-disaster environment there is an understandable emphasis on the care of physical morbidity and the restoration of public utilities and community infrastructure. This is a difficult environment in which to design, gain approval for and implement treatment outcome research. This was the case with the SBTP, although the local teaching hospital Ethics Committee did grant permission for a randomised treatment trial of the SBTP treatment interventions. This Ethics Committee agreed with arguments that children with emotional trauma warranted as detailed and rigorous an understanding of the effectiveness of the proposed treatments as did children with other physical and emotional health morbidities. Despite this supportive response from the Ethics committee funding was not

available for a naturalistic or more rigorous treatment outcome study or a follow-up of psychopathology in the treatment group.

13.5 Client Satisfaction

As a minimum evaluation a detailed client satisfaction survey concerning the workbook and group program was undertaken. The questionnaire comprised 10 questions with multiple response fields based on an existing instrument (Plapp & Rey, 1994). The survey was anonymous and sent to parents and children 1 month after completion of the workbook. Parent satisfaction with the workbook was high, 91% of parents stating that the book helped their child ‘a great deal’ or to ‘some extent’. 97% of parents were reasonably or very satisfied with the book and 97% found the advice included was reasonably or very useful. 82% of parents felt a workbook was an acceptable treatment strategy. The remainder (18%) were neutral about this approach. Many parents (42%) felt the workbook helped them ‘a great deal’ to talk to their child about the bushfires, whilst another 54% felt that talking to their child was aided to some extent. The great majority of parents (97%) reported that they would recommend the workbook to another family in a similar situation. The most prominent criticism was that many parents (57%) thought the book was too long. Parents of Infant School children mostly reported this and that a separate, briefer, less sophisticated resource was required for the younger age group.

Children, independent of their parents, also completed a satisfaction questionnaire. Most children (87%) felt using the workbook helped, assisting them to talk about the bushfires (90%). Using the workbook in the home environment was considered to be a good idea (67%) and most would ‘very much’ (57%) or ‘to some extent’ (26%) recommend this resource to another child. Children commented that their parents or caregivers often read the information in the workbook (89%) and the parent/caregiver group also often helped with workbook tasks (76%). Aspects of the workbook children most liked were the picture colouring tasks (often bushfire-related pictures), the dialogue from the cartoon figures, and certificates they could remove and send to firefighters or other individuals to thank them for their help. Bushfire

stories, empty pages to add their own work, feeling questions and information boxes were also positively cited.

13.6 Summary

Children identified as experiencing significant post-disaster emotional distress received an intervention with a guided trauma workbook as the primary strategy, integrated with review by a counsellor. Adolescents attended a group therapy program. Treatment principles reflected the diverse professional backgrounds of the authors of the workbook. The developmental appropriateness of material was paramount. The workbook contained parent and child sections, the group program was more adolescent focused. Consumer satisfaction, both from parent and child perspectives was high, over 90% of parents were positive, 97% satisfied, 82% considered a workbook an acceptable post-disaster treatment modality. 90% of children stated the workbook helped them to talk about the bushfire disaster.

CHAPTER 14

PTSD AND GENERAL PSYCHOPATHOLOGY IN CHILDREN FOLLOWING THE 2003 CANBERRA BUSHFIRE DISASTER

14.1 Introduction

The Australian Capital Territory (ACT) experienced devastating bushfires in 1926, 1939, and 1952. However, the fires culminating in destruction in Canberra's suburbs on January 18, 2003 were the worst in recorded history. For the preceding week bushfires burnt in remote ACT national parks and had not threatened suburban areas. These fires were extensive, in rugged settings and difficult for fire-fighters to access. The broader ecological context was a severe and persisting drought across the eastern seaboard of Australia.

From mid-January the situation deteriorated, principally because of weather conditions typically associated with bushfire disasters: high temperatures, low humidity, strong winds and wind shifts that were difficult to predict. The existing fires spread into a historic pine plantation, Stromlo Forest, adjacent to the western suburbs of Canberra. Once established in the pine forest the fire front moved with great speed into adjacent residential suburbs. Whilst the fire destroyed houses in many Canberra suburbs, in the suburb of Duffy the devastation was greatest with the loss of nearly every home in several streets.

In the bushfire disaster four people were killed, 530 houses were destroyed and many more damaged. Infrastructure was destroyed including some school buildings. The estimated insurance loss was AUD\$250 million. Further losses were only prevented by an effective 20 kilometre firebreak protecting the northern suburbs, an amelioration of the extreme weather conditions and other suburbs being less vulnerable given a greater distance between houses, natural forests and pine plantations.

The aim of post-disaster screening in Canberra was to respond to a school community that requested assistance in the identification and early intervention of children and adolescents who experienced a significant mental health morbidity following the bushfire disaster. The research element was to extend past research on post-bushfire disaster child and adolescent psychopathology by using a contemporary measure of Post Traumatic Stress Disorder (PTSD) and incorporate a measure of general psychopathology in the screening battery. Further, to investigate with greater clarity bushfire exposure and its relationship to PTSD and lastly, to compare child and adolescent report of PTSD, and parent-report of child and adolescent post-disaster general psychopathology.

14.2 Hypotheses

14.2.1 Hypotheses relating to Post traumatic stress disorder

Replicating findings from the Sutherland Bushfire Trauma Project:

- (1) A similar percentage (approximately 12%) of children and adolescents will self-report an elevated level of post-disaster PTSD symptoms.
- (2) Females will report statistically significantly higher mean PTSD scores.
- (3) Younger children will report statistically significantly higher mean PTSD scores.
- (4) The characteristics of individual's bushfire experience will be related to the individual's level of PTSD:

- (a) Children who actually saw flames will have a statistically significantly higher mean PTSD score.
 - (b) There will be a statistically significant inverse correlation between a child's PTSD score and their estimation of their closest distance to the bushfire.
- (5) The child's appraisal of the threat of the bushfire will be related to the level of PTSD such that:
- (a) Children who perceive that they may have died during the bushfire disaster will have a statistically significantly higher mean PTSD score.
 - (b) Children who perceive that their parents may have died during the bushfire disaster will have a statistically significantly higher mean PTSD score.
- (6) Children whose homes were damaged or destroyed will have a statistically significantly higher mean PTSD score

14.2.2 Hypotheses relating to the relationship between parent-report of child general psychopathology and child-report of Post traumatic stress disorder

- (1) The mean parent-report general psychopathology score will be statistically significantly higher in children who report PTSD symptoms.
- (2) The mean parent-report emotional psychopathology subscale score will be statistically significantly higher in children who report PTSD symptoms.
- (3) The mean parent-report attention deficit psychopathology subscale score will not be statistically significantly higher in children who report PTSD symptoms.
- (4) The mean parent-report conduct psychopathology subscale score will not be statistically significantly higher in children who report PTSD symptoms.
- (5) The mean parent-report peer subscale score will not be statistically significantly higher in children who report PTSD symptoms.

14.2.3 Hypotheses relating to parent-report of child general psychopathology and bushfire-related events and children's perception of threat.

(1) The characteristics of individual's bushfire experience will be related to the individual's level of general and emotional psychopathology but not conduct, attention deficit and peer-related psychopathology:

- (a) Children who saw flames will have a statistically significant higher mean general and emotional psychopathology score.
- (b) There will be a statistically significant inverse correlation between a child's general and emotional psychopathology score and their estimation of their closest distance to the bushfire.

(2) The child's appraisal of the threat of the bushfire will be related to the level of psychopathology such that:

- (a) Children who perceive that they may have died during the bushfire disaster will have a statistically significantly higher mean general and emotional psychopathology score.
- (b) Children who perceive that their parents may have died during the bushfire disaster will have a statistically significant higher mean general and emotional psychopathology score.
- (c) There will be no statistically significant elevation in attention deficit, conduct or peer-related psychopathology in children who perceive that they may have died or their parents may have died during the bushfire disaster.

(3) Children whose homes were damaged or destroyed will have a statistically significant higher mean general and emotional psychopathology scores but not elevated attention deficit, conduct or peer-related psychopathology.

14.3 Method

The school-based screening procedure employed in the SBTP and discussed in section 6.2 formed the basis of the Canberra study. Given the smaller Canberra

sample size ($N = 225$ versus $N = 2379$) and the involvement of only one Canberra School, only two screening personnel were required. Both were experienced child and adolescent mental health practitioners (psychologist and child psychiatrist). Consistent with the SBTP screening all forms and procedures were standardised, followed a research protocol and were subject to pre-screening training. Given the experience gained from the SBTP no pilot phase was deemed necessary.

14.4 Participants

The study population consisted of all children in grades 4 to 12 attending a non-denominational private school in the Canberra bushfire-disaster area. This school would have been designated a 'bushfire-affected' school by the SBTP criteria (see section 4.3.2): there was direct damage to school buildings by the bushfire, obvious damage to nearby structures, extensive areas of blackened, fire-affected land had to be passed by children to attend the school and the school included students whose homes had been either damaged or destroyed by the bushfire.

The sample size was 222 children and adolescents. Female students comprised 54.9% of the sample. Participants ages varied from 8 to 18 years (mean 12.50 years SD 2.48). Participants came from grades 4 to 12, number of students per grade varied from 12 (grade 12) to 45 (grade 5).

14.5 Inclusion and exclusion criteria

The screen attempted to include all children with informed consent who, in the estimation of parents and teachers had the auditory, English language and intellectual capacity to understand the screening questions when read aloud and record an answer by placing a tick on a scoring sheet. Screening questions were not read aloud to grade 8 - 12 students. For all students a staff member was available to assist with understanding and scoring the form. Similar to the SBTP procedure children with intellectual impairment, who, in the opinion of teaching staff could not complete the screening questionnaires were not screened. However, there was a high level of staff

and parent awareness of the vulnerability of these children. The mental health and general functioning of this group was closely monitored by staff and in several cases such individuals received individual counselling and support services following the bushfire disaster.

14.6 Measures

14.6.1 The PTSD Reaction Index

The Post Traumatic Stress Disorder Reaction Index (PTSD-RI) (Frederick, 1985; Frederick, Pynoos & Nader, 1992) is a 20 item measure of PTSD in children and adolescents. Items are worded to include the name or description of the traumatic event of interest, in this case bushfires. All items have five response fields; none of the time, little of the time, some of the time, much of the time, most of the time. The total PTSD scores allow case categorisation of individuals into doubtful, mild, moderate, severe and very severe PTSD.

The PTSD-RI has been extensively cited in the child and adolescent trauma research literature. Several studies have assessed the concurrent validity of the PTSD-RI. Frederick reported a correlation between the PTSD-RI and established PTSD cases of .91 (Frederick, 1985). Frederick also reported a correlation of .87 between the PTSD-RI and the Minnesota Multiphasic Personality Inventory subscale designed to measure PTSD (Frederick, 1987). Pynoos, Goenjian and Karakashian (1993) reported that child survivors of the Armenian earthquake disaster with PTSD-RI scores in the severe range, 90% met DSM IIIR PTSD criteria. There has been one literature report of the discriminant validity of the PTSD-RI. La Greca, in an unusual study in that it included detailed psychometric information on children prior to a hurricane disaster, found the PTSD-RI and a measure of trait anxiety only had a modest shared variance suggesting the instruments were measuring separate constructs (La Greca, 1996).

Several studies have reported internal consistency values between .83 and .89 for the PTSD-RI (Lonigan, Shannon, Taylor, Finch, et al., 1994; Vernberg, Silverman, La Greca, & Prinstein, 1996) suggesting the scale is suitable for research

purposes. No study of the test-retest reliability of the PTSD is known to the author. The likely cause is the reticence of parents and teachers to allow the repeated administration of measures of emotional distress to children in the post disaster environment.

14.6.2 The Strengths and Difficulties Questionnaire

The Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997; Goodman, 2001) is a brief screening questionnaire of child and adolescent psychopathology. The questionnaire has parent, teacher and self-report versions and either a two section initial review form or a three section follow-up form. The SDQ comprises 25 questions on psychological attributes divided into 5, 5 question symptom subscales: emotional symptoms, conduct problems, hyperactivity /inattention, peer relationship and prosocial behaviour. Responses to the first four subscales are combined to create a total difficulties score. Section B questions inquire about symptom chronicity, distress and social impairment. The SDQ total and subscale scores can be classified as ordinal variables with normal, borderline and abnormal categories. Published 'caseness' definitions (www.sdqinfo.com) state that approximately 10% of scores from a child and adolescent community sample should be in the abnormal band and a further 10% in the borderline band for the total and subscale categories.

There is evidence of convergent validity with highly correlated scores on the parent and teacher SDQ and the parent and teacher Rutter Scales (Goodman, 1997). Similarly, the parent-report Child Behavior Checklist (Achenbach, 1991) was highly correlated with the parent report SDQ and the SDQ was considered superior at detecting hyperactivity and inattention problems (Goodman & Scott, 1999). Several studies have demonstrated discriminant validity including the ability of the SDQ to differentiate between community youth and youth attending a mental health clinic (Goodman, Meltzer, Bailey, 1998) and children aged 4 to 7 years attending either psychiatric or dental clinics (Goodman & Scott, 1997).

The SDQ factor structure has been confirmed by its author (Goodman, 2001) as well as independent confirmation of a Swedish parent version of the instrument

used to rate 900 general population children aged 6 to 10 years (Smedje, Broman, Hetta & von Knorring, 1999). The reliability of the SDQ has been studied in a community sample of 7984, 5 to 15 year-old British children. The parent, teacher and child report SDQ identified psychiatric diagnoses with a specificity of 94.6% and sensitivity of 63.3%. Identification was better for conduct, hyperactivity, depressive and some anxiety disorders, identification was less robust (under 50%) in individuals with specific phobia, separation anxiety and eating disorders. The multi-informant SDQ was more sensitive than a single informant version (Goodman, Ford, Simmons, Gatward & Meltzer, 2000). SDQ psychometrics analysis was also conducted on a Finnish version of the SDQ. In a community sample of 735, 7 to 15 year old Finnish children and adolescents the correlation of the parent SDQ total score with the CBCL and the self-report SDQ with the Youth Self Report (Achenbach, 1991) were both above 0.7, the internal consistency of all three SDQ questionnaire versions was 0.71 and inter-rater reliability between parent, teacher and self-report SDQs was between 0.38 and 0.44 (Koskelainen, Sourander & Kaljonen, 2001).

Table 14.1 summarises the internal consistency of measures used in screening children in Canberra. The PTSD-RI alpha results for the total sample and by school grade category (Primary School, Junior High, Senior High) are above the 0.80 criteria of Carmines and Zeller (1979) and it can be concluded that this measure is suitable for research with this sample. The SDQ results are more difficult to interpret. The alpha results for the SDQ peer subscale range from 0.51 (total sample) to 0.14 (High School participants); this scale, in this sample, appears to be unreliable and results using this scale should be viewed with caution. Of the remaining scales all appear reliable although results for the conduct subscale less so (range 0.64 – 0.73). More caution is required in interpreting analyses on the High School group given the smaller sample size.

Table 14.1
Internal consistency of measures used in screening children in Canberra

	<u>Cronbach Alpha</u>							
	<u>Total</u>		<u>Grade</u>		<u>Grade</u>		<u>Grade</u>	
	α	N	α	N	α	N	α	N
PTSD RI	0.89	199	0.90	104	0.86	53	0.88	42
SDQ Total	0.85	154	0.87	87	0.79	45	0.82	22
SDQ Emotion	0.80	157	0.83	90	0.74	45	0.73	22
SDQPeers	0.51	160	0.59	93	0.27	45	0.14	22
SDQHyperactivity	0.82	158	0.85	91	0.68	45	0.87	22
SDQ Conduct	0.71	162	0.73	94	0.70	46	0.64	22

14.7 Statistical analysis

The parent-report of bushfire related factors and an overview of variables and statistical tests are described in greater detail in chapter 6. In summary, gender was analysed as a binary covariate. Age, Total PTSD-RI score, total SDQ score and SDQ subscale scores were analysed as continuous variables. PTSD-RI scores were also converted into ‘caseness’ categories and analysed as an ordinal variable. All other variables were analysed as binary covariates. Analysis included bivariate statistical tests such as χ^2 for two categorical variables, and t Tests when one variable was binary, the other continuous. Multivariate analysis, such as generalised equation modelling, was used to adjust for the influence of potential confounders, such as age and gender when considering variables of primary interest, such as the total PTSD score. Multivariate analysis also accounted for the relative contribution of bushfire related variables and general psychopathology symptoms to the goodness of fit of such a model. Statistical analysis is considered in more detail in chapter 6, section 6.6; bivariate analysis in 6.6.2, generalised equation modelling in 6.6.3.

14.8 Results

14.8.1 Children and Adolescent's Bushfire Experiences and Perceptions

Referring to Table 14.2, the majority of students were close enough to the bushfire to see flames (60.2%); slightly more saw smoke (69.5%). Statistically significantly more female students reported seeing smoke. Few students stated they were alone at home on the day of the bushfire (9.5%). A minority of student's homes were damaged (10.9%) and they had to live elsewhere (8.4%) during the aftermath of the bushfire. Some students (11.1%) felt they were in danger of dying during the bushfire. Many more (28.5%) were concerned their parents may have died. Female students were statistically significantly more likely to express concerns about the threat to themselves and their parents.

Table 14.2

Bushfire-related Experiences and Perception of Threat

	<u>Total</u>		<u>Male</u>		<u>Female</u>		χ^2	<i>P</i>
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%		
Saw fire (flames)	100	60.2	42	56.0	55	62.5	0.71	NS
Saw smoke	121	69.5	63	80.8	56	60.2	8.46	0.01
Home damage	23	10.9	11	11.9	11	9.5	0.33	NS
Live elsewhere	18	8.4	11	11.8	6	5.4	3.19	NS
Home alone on day	16	9.5	7	9.2	9	10.0	0.03	NS
Thought may die	24	11.1	5	5.3	19	15.8	5.85	0.02
Family may die	61	28.5	20	21.3	41	35.0	4.81	0.02

14.8.2 Post disaster PTSD symptoms

Figures 14.1: Histogram of the Total PTSD-RI Score and Figure 14.2 Box-plot of the PTSD-RI score graphically represent the distribution of student responses to the PTSD-RI. The distribution is skewed with a long right hand tail. Several outliers are illustrated on the Box-plot.

The mean PTSD-RI score was 16.36, SD 13.64 (95% CI 14.45 – 18.27). Applying the published cut-off scores for the PTSD-RI (see section 14.6); 100 (50.2% of total sample) students were categorised as doubtful PTSD, 57 (28.6%) mild PTSD, 24 (12.1%) moderate PTSD, 15 (7.5%) severe and 3 (1.5%) very severe PTSD.

There was no statistically significant difference in PTSD-RI scores by gender, either when analysing the total sample or when the sample was stratified by school grade (primary school = grades 4, 5, 6; junior high = grades 7, 8, 9; senior high = grades 10, 11, 12).

Figure 14.1
Histogram of the Total PTSD-RI Score

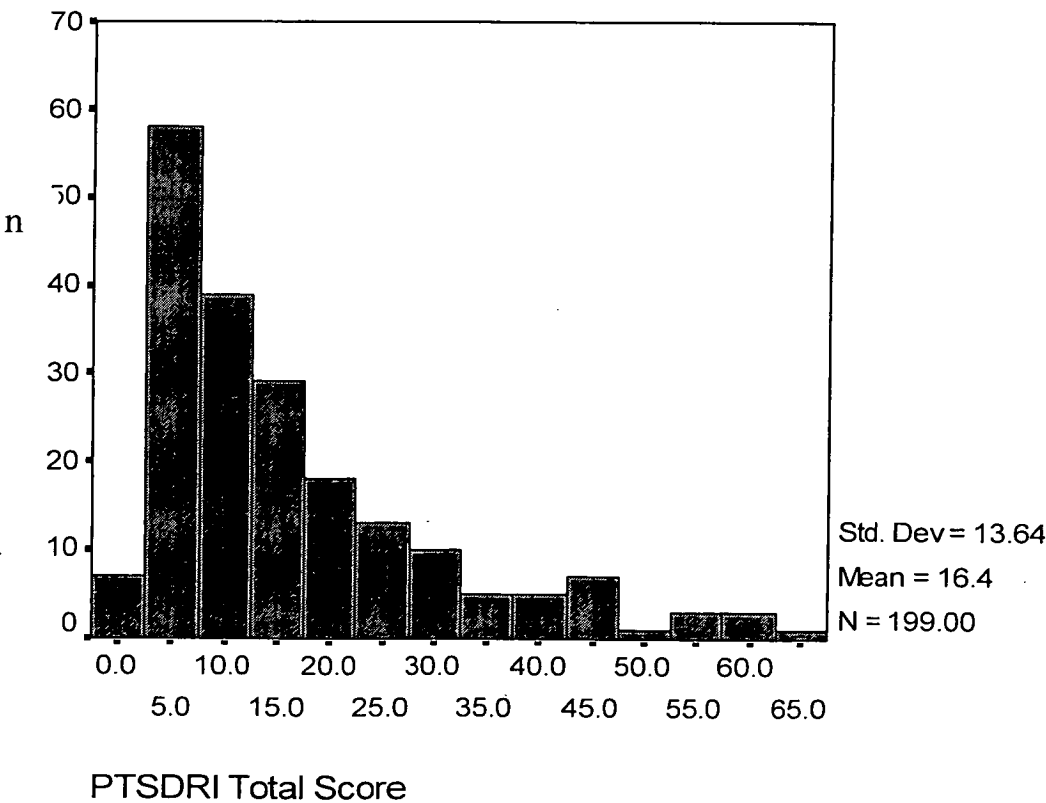


Figure 14.2

Box-Whisker Plot of PTSD-RI score.

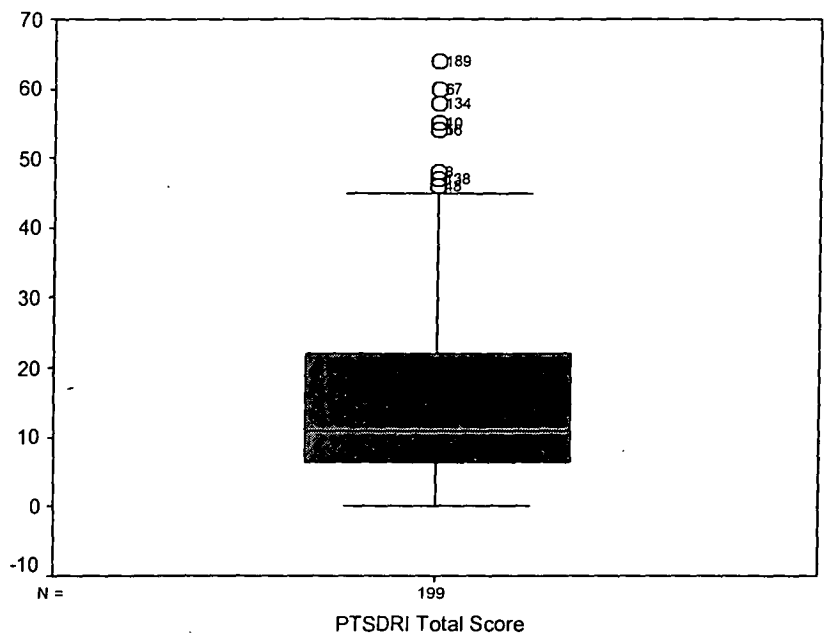


Figure 14.3

Scattergram of Age by PTSD-RI score

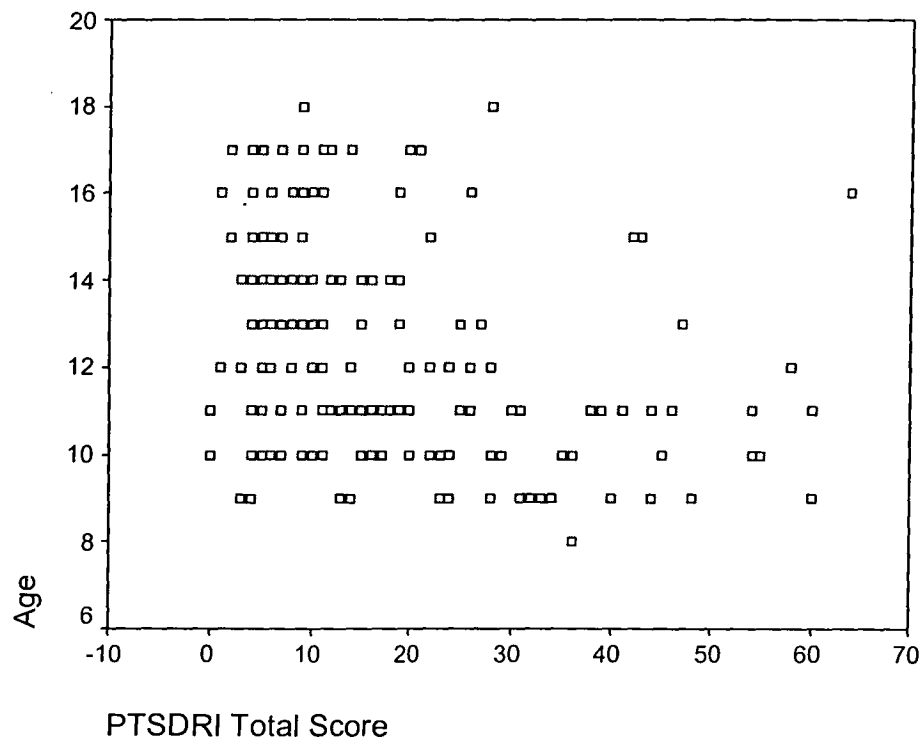


Figure 14.3 displays the relationship between participant age and mean PTSD-RI score. There is a statistically significant correlation with younger students reporting higher mean PTSD-RI scores (*Pearson correlation* = -0.326, *p* = .000 (2-tailed)). When analysing the relationship between PTSD and school grade, consistent with the findings for the whole sample the PTSD-RI mean score was statistically significantly higher in younger, Primary School students. The mean PTSD-RI scores of Junior and Senior High school was not significantly different; see Table 14.3.

Table 14.3
Bivariate analysis of Bushfire-related factors and PTSD-RI

	M	SD	M	SD	t	p
<u>Gender</u>	<u>Male</u>		<u>Female</u>			
	15.08	12.62	16.77	14.35	-0.84	0.40
<u>Grade</u> 4, 5, 6	19.31	15.02				
7, 8, 9	13.52	10.46			F ₂ =	
10, 11, 12	11.26	11.61			6.57	0.01
	<u>YES</u>		<u>NO</u>		t	p
See flames	17.94	16.01	13.46	10.39	1.86	0.05
Close to flames	22.57	18.30	14.40	12.30	2.70	0.01
See smoke	17.42	14.21	13.09	12.65	1.77	0.08
Home damage	20.63	15.18	14.94	13.05	1.76	0.08
Live elsewhere	16.07	11.52	15.62	13.52	0.12	0.90
Home alone	24.07	16.21	14.85	13.22	2.41	0.02
Thought may die	33.00	16.68	14.18	11.96	5.93	0.001
Thought parents die	25.04	15.32	12.06	10.69	6.46	0.001

14.8.3 Relationship of PTSD-RI and bushfire related factors

Referring to Table 14.3, there was no statistically significant gender difference in PTSD-RI scores. The experience of several bushfire-related factors statistically significantly differentiated individual's PTSD-RI scores. Students reported statistically significantly higher PTSD-RI scores if they actually saw the bushfire flames, judged they were 50 meters or closer to the flames, were alone at home during the bushfires, or reported a perception that they may have died, or their parents may have died during the bushfire-disaster. The 10-item self-report scale of how frightening the individual perceived the bushfire was statistically significantly correlated to the PTSD-RI score (*Pearson's $r = 0.44$, $p = .001$*).

Table 14.4 summaries the results of a multivariate analysis of students PTSD-RI scores, modelling the students gender, school grade and bushfire-related events and perception of threat. Explanatory variables that independently contributed to the model include the individual's school grade, an exposure factor; whether the individual perceived they were 50 meters or closer to the flames, and whether they thought they may have died during the bushfire disaster.

Table 14.4

Multivariate associations of PTSD-RI with explanatory covariates: results of linear regression model

<i>OutcomeExplanatory variables</i>		<i>β (SD)</i>	<i>p</i>
PTSD-RI $R^2 = 42.0\%$	Constant	76.34 12.82	0.001
	School grade	-1.92 0.55	0.001
	Home alone	-6.52 2.35	0.01
	How close to flames	-7.15 2.67	0.01
	Think may die	-8.39 4.06	0.05
	How frightened	0.86 0.47	0.07
	Think parents may die	-3.73 3.05	0.22

Model ANOVA ($F(7) = 9.95$, $p = .000$)

14.8.4 Post disaster parent-report of children’s general psychopathology symptoms

Table 14.5 summaries the total SDQ and SDQ subscale scores for the sample, stratified by Primary School, Junior High School and Senior High School categories.

There were no statistically significant differences in total general psychopathology scores or psychopathology subscale scores across school grade categories. There were no gender differences in total SDQ score or emotional, conduct and peer subscale scores for the total sample. The mean hyperactivity subscale score for boys was statistically significantly higher than the girls score ($t(156) = 3.58, p = .000$). This result was replicated on the self-report SDQ completed by grade 10, 11, and 12 students ($t(20) = 2.76, p = .01$) and parent report of grade 7, 8 ,9 students ($t(43) = 2.52, p = .01$) and grade 4, 5, 6 students ($t(89) = 2.02, p = .05$). Boys in the younger grades (4, 5, 6) also scored statistically significantly higher on the conduct subscale ($t(92) = 2.09, p = .04$).

Table 14.5
SDQ Total and subscale scores by Grade

	<u>Grade</u>						<i>F</i>	<i>p</i>
	<u>4, 5, 6</u>		<u>7, 8, 9</u>		<u>10, 11, 12</u>			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
<i>SDQ Total</i>	7.80	6.42	6.55	4.97	7.14	5.47	.68	NS
<i>Emotional</i>	2.63	2.66	2.00	2.27	2.32	2.08	.99	NS
<i>Hyperactive</i>	2.68	2.64	2.31	1.89	2.77	2.89	.67	NS
<i>Conduct</i>	1.46	1.80	1.30	1.77	0.86	1.32	1.1	NS
<i>Peer</i>	1.41	1.66	0.91	1.14	1.18	1.22	1.7	NS

Table 14.6 summaries the abnormal case status for the total sample and Primary School, Junior High and Senior High groups.

There is considerable variability in the percentage of individuals in the abnormal category on the SDQ total scale and subscales. Considering the total sample, on all scales other than the emotional subscale, approximately 10% of the total sample is in the abnormal category (8.4% to 10.5%). The excess of total sample individuals categorised in the abnormal range of the emotional subscale (23.6%) is also found in the Primary school, Junior and Senior High groups (28.9%, 17.8% and 13.6% respectively). The finding of no Junior High School student in the abnormal range on the hyperactivity subscale is likely to be a chance error, more probable given the low sample size. Between school grade (Primary School, Junior and Senior High) tests of significance were not undertaken given the low cell size in an analysis of caseness category by school grade.

Table 14.6
Percentage of the sample in the abnormal case status by school grade

	<u>Grade</u>			
	<u>Total</u>	<u>4, 5, 6</u>	<u>7, 8, 9</u>	<u>10, 11, 12</u>
	%	%	%	%
<i>SDQ Total</i>	8.4	10.3	4.4	9.1
<i>Emotional</i>	23.6	28.9	17.8	13.6
<i>Hyperactive</i>	10.5	9.6	15.2	4.5
<i>Conduct</i>	9.5	13.2	0	13.6
<i>Peer</i>	8.8	9.7	6.7	9.1

14.8.5 The relationship between parent-report of child general psychopathology and bushfire-related factors and experiences

There was no statistically significant difference in SDQ total or subscale scores between children and adolescents who saw bushfire flames and those that did not. Further, there was no statistically significant difference in the proximity of children and adolescents to the bushfire (measured by estimated meters to bushfire flames) and the SDQ total or subscale scores.

Children and adolescents who experienced home damage scored statistically significantly higher mean emotional subscale scores than those children who did not experience home damage ($t(125) = 2.48, p = .01$). There were no statistically significant differences between home damage groups on the total SDQ scale or hyperactivity, conduct and peer subscales. There was a similar result if children and adolescents had to live somewhere other than their home in the post-disaster period. No statistically significant differences were found on the hyperactivity, conduct and peer subscales. The 'live elsewhere' group had statistically significantly higher mean emotional subscale scores ($t(128) = 2.07, p = .04$), as well as total SDQ scale scores ($t(126) = 2.10, p = .04$).

Table 14.7 summarizes the relationship between children and adolescents' bushfire-related perception of threat to themselves and their parents and general psychopathology. Of the 12 children (8.8% of the sample) who stated being fearful they may have died during the bushfire disaster, this group scored statistically significantly higher than other children on the SDQ total score and all subscales other than the hyperactivity subscale. More children ($N = 37, 27.0\%$ of the sample) were fearful their parents may have died during the disaster. Again this group scored statistically significantly higher than other children on the SDQ total score. However, their subscale profile was different, this group scored statistically significantly higher on the conduct and hyperactivity subscales, not higher on the emotional and peer subscales.

Table 14.7
SDQ Total and subscale scores by perception of threat to self and parents

	<u>Threat perception to self</u>						<i>t</i>	<i>p</i>
	<u>YES</u>		<u>NO</u>					
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
<i>SDQ Total</i>	11.67	7.92	6.95	5.47			2.73	.007
<i>Emotional</i>	3.67	2.67	2.22	2.37			2.00	.048
<i>Hyperactive</i>	3.54	2.96	2.47	2.33			1.53	.129
<i>Conduct</i>	2.31	2.25	1.24	1.61			2.19	.030
<i>Peer</i>	2.00	1.53	1.14	1.47			1.99	.048

	<u>Threat perception to parents</u>						<i>t</i>	<i>p</i>
	<u>YES</u>		<u>NO</u>					
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
<i>SDQ Total</i>	9.23	6.87	6.62	5.33			2.28	.024
<i>Emotional</i>	2.86	2.46	2.14	2.40			1.50	.136
<i>Hyperactive</i>	3.58	2.93	2.28	2.15			2.14	.034
<i>Conduct</i>	1.78	1.97	1.14	1.56			1.99	.048
<i>Peer</i>	1.49	1.63	1.12	1.43			1.28	.202

14.8.6 The relationship between parent-report of child general psychopathology and child-report of Post traumatic stress disorder

There was a statistically significant correlation between higher PTSD-RI scores and higher SDQ total, hyperactivity and conduct scores. The correlations were weak (Pearson’s correlation range: $r = 0.12 - 0.25$), see Table 14.8. When stratified for sample gender; the statistically significant correlations remained between the PTSD-RI and the SDQ Total and conduct subscale for males. For females, statistically significant correlations remained between the PTSD-RI and the SDQ hyperactivity and conduct subscales. No Pearson’s correlation value was greater than 0.31.

When the sample was stratified by school grade (Junior School versus High School) and gender, there was no statistically significant correlation between the PTSD-RI and SDQ total or subscale scores for High School students. For Primary School students the only statistically significant correlation was between the PTSD-RI and the SDQ conduct subscale in male students (Pearson’s correlation; $r = 0.42$, $p = .02$).

Table 14.8
Correlations between parent-report of child general psychopathology and child-report of Post traumatic stress disorder (Pearson’s r)

	<u>PTSD-RI</u>					
	<u>Total sample</u>		<u>Male</u>		<u>Female</u>	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
SDQ-Total	0.21	0.02	0.28	0.03	0.18	0.14
SDQ-Emotion	0.12	0.20	0.11	0.43	0.11	0.37
SDQ-Hyperactivity	0.19	0.04	0.22	0.08	0.23	0.06
SDQ-Conduct	0.25	0.01	0.31	0.01	0.22	0.07
SDQ-Peer	0.13	0.14	0.18	0.17	0.09	0.43

14.9 Discussion

Six months following the bushfire disaster 12.1% of children and adolescents self-reported symptoms consistent with moderate PTSD and 9% severe to very severe PTSD. There was no significant difference in the level of PTSD by gender. Younger school students reported statistically significantly more PTSD symptoms. PTSD symptoms were significantly related to the student’s perception of threat to themselves and to their parents, whether they were at home alone on the day of the bushfire disaster, whether they could see the actual bushfire flames and whether, in

their estimation they were within 50 meters of the actual flames. There was also a significant correlation between a simple ten item self-report scale of the students' perception of how frightening the bushfire disaster was and their PTSD symptoms. The student's school grade, whether they were home alone, whether in their perception they were within 50 meters of the flames and whether the student thought that they might die during the disaster were independent predictors of the individual's PTSD symptoms.

Earlier reports of child and adolescent emotional distress following a bushfire disaster, (see chapters 9 and 10; McDermott & Palmer 1999, McDermott & Palmer 2002) using an older measure of emotional distress estimated 12% of Primary School children and somewhat fewer High School children experienced PTSD. The findings from this study, using an instrument designed to be consistent with a DSM IV PTSD diagnosis, replicates the earlier findings. Other similar findings include higher PTSD scores for children in earlier school grades, in children who were at home alone during the bushfire disaster, who experienced home damage and perceived there was a threat to the life of themselves or their parents. This study extends the earlier findings by quantifying that the closer to the actual flames the more likely children were to report significantly higher PTSD symptoms as well as the value of asking children to score on a simple 10-item likert scale how frightened they felt during the bushfires.

This study included a general psychopathology screening measure. Consistent with the published community norms for the Strength and Difficulties Questionnaire (SDQ) approximately ten percent of students scored in the abnormal range for the total difficulties subscale on the SDQ. Similarly, approximately ten percent of students scored in the abnormal range on the hyperactivity, conduct and peer SDQ subscales. More than twenty percent of students scored in the abnormal range on the SDQ emotional subscale.

The PTSD-RI and SDQ were not statistically significantly correlated in older children and only weakly correlated in younger children. It is therefore unlikely that the SDQ is a good screening measure for post-disaster PTSD in children and adolescents. Further support of this conclusion includes finding no statistically significant differences between the SDQ and measures of bushfire exposure such as witnessing actual flames and the individual's perceived proximity to the fire. As mentioned above these bushfire-related events were significantly correlated to the

PTSD-RI and it is established in the research literature that disaster exposure is an independent predictor of subsequent PTSD symptoms.

However, the SDQ total and emotional subscale scores were significantly higher if the individual experienced bushfire-related home damage and the necessity to live elsewhere following the fire. Further, these subscales were related to disaster-related threat perception to self and parents. It may be that the elevated SDQ total and emotional subscales are identifying bushfire-related events that are associated with negative emotions including feelings of loss and grief, as may be the case if a child experienced home damage or destruction, separation from parents or concerns they may die. This is also consistent with the findings reported in chapters nine and ten that depressive symptoms are a common feature of child and adolescents post-disaster psychopathology. Further research, including investigating the relationship of the SDQ to a measure of depression is needed to clarify this point. Nevertheless the relationship of the SDQ to bushfire-related factors is probably insufficient to include the SDQ in a post-disaster psychological screening battery, given questions such as perception of threat and home damage can be asked in a simple, single item format rather than necessitating the administration of a 26 item questionnaire.

In summary, post-disaster screening for PTSD in children and adolescents should target younger school age children, who were physically close to actual flames, on self-report stated the experience was extremely frightening, have high levels of perceived threat to themselves or parents and who experienced home loss or damage. Administration of the PTSD-RI to this group identifies children across PTSD severity categories. Administration of the parent version of the SDQ does not assist in identification of PTSD symptoms. However, the SDQ total and emotional subscales may identify children with post-disaster non-PTSD anxiety and depressive symptoms.

14.10 Summary

A post-bushfire disaster service provision project screened 222 children and adolescents from grades 4 to 12, using a measure of Post Traumatic Stress Disorder (PTSD) and a measure of general mental health symptoms. Six months after the

bushfire disaster 9% of children and adolescents experienced severe or very severe PTSD. Significantly higher PTSD symptoms occurred in children in earlier school grades, who were home alone during the disaster, actually witnessed flames, perceived the flames were closer, and perceived they may have died during the disaster. General psychopathology levels were not elevated other than a doubling of children in the abnormal range on an emotional subscale. Whilst not strongly correlated to PTSD, elevated emotional subscale scores are likely to reflect greater levels of post-disaster depressive symptoms and feelings of grief and loss.

CHAPTER 15

CONCLUSIONS AND FUTURE DIRECTIONS

This research is the only large scale investigation currently published of children's emotional responses following a bushfire disaster that utilized child-report of psychopathology and included children across the whole school age range. It is one of only a few similar studies following any disaster.

Key findings include that the majority of children report some post-disaster psychopathology. A minority, approximately 12% of Primary School children are above cut-off scores for a significant emotional trauma. Overall female students and students in the middle grades (grade 7-9) are more likely to self-report emotional trauma symptoms. However, the relationship between symptoms and age is complex. High trait anxiety and concurrent depressive symptoms make emotional trauma symptoms more likely, so too disaster-related factors such as an evacuation experience and high levels of threat perception about oneself or one's parents. A separate analysis of children whose parents were volunteer fire-fighters found this group were not more susceptible to emotional distress symptoms. They did experience relatively more depressive symptoms. This profile is possibly because they experienced some degree of familiarity or stress inoculation to fire exposure but were vulnerable to feelings of separation and grief given their parent's dangerous role as a volunteer fire-fighter.

A new self-report measure of Post traumatic stress disorder in Infant School children was found to have good internal consistency. Using this instrument these younger children were able to affirm negative disaster-related feeling states. Relatively more younger children expressed fearfulness about dying during the disaster. As with older children, girls were more symptomatic. However, unlike older children the symptom self-report of younger children was not related to evacuation or separation experience.

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Parents reported much lower levels of child symptoms. This is consistent with the literature on other forms of internalizing disorders such as anxiety and depressive conditions in which the child-parent symptom concordance is low. If the child mentioned being fearful of dying, their parents did report more emotional trauma symptoms than in other children.

The implication of this study goes beyond investigating child and adolescent psychopathology and correlated factors. The mental health service provision dimension of the school as a site of service delivery has potentially far reaching implications. This study demonstrated that a school-based mental health screening regime is acceptable to parents and to school authorities. Possibly the school is the only practical screening site given it is the usual place in which large numbers of children gather. Screening proved a pragmatic aid to case identification. However, more research is required to establish the sensitivity and specificity of suitable screening instruments.

The initial studies reported in this thesis used a 13 question version of the Impact of Event Scale (IES). It is unlikely this measure will be used again. Changes in diagnostic classifications, especially the addition in DSM-III and DSM-IV of cluster D (autonomic arousal) symptoms mean the IES total score and to a lesser extent the IES intrusion and avoidance subscales do not match current diagnostic criteria. Further, the IES was not an instrument designed for use with children. Concerns about the IES-13 version used in the SBTP, including the subscales not equating to current DSM IV symptom clusters is why the PTSD-RI was trialled in the Canberra 2003 study. These concerns do not preclude further analysis of the SBTP IES-13 subscale data although it will be difficult to extrapolate the results of analyses with findings from more recent measures. More recent IES developments include the work of Yule and colleagues who analysed the IES responses from children 8 years of age and older and created of an 8-item version (Yule, 1997). The same group expanded the 8-item version by including 5 cluster D symptom items to create the Children's Impact of Event Scale (CRIES-13) see (www.childrenandwar.org). Both the brief 8-item version and the CRIES-13 should be assessed as potential screening instruments.

Future developments are likely to include two or three stage screening in which pencil and paper tests are then followed by more rigorous investigation such as an interview using a structured diagnostic instrument. This strategy would also provide

information on the convergent and discriminant validity, and specificity and sensitivity of the screening measure.

This research was not designed to be a treatment effectiveness study. However, ethical screening to case identify predicates the provision of an intervention. In the project two interventions, a guided workbook and adolescent group program were employed. It is very likely that without offering interventions parents and teachers would not have supported the project. Patient and parent satisfaction ratings suggested the interventions were strongly supported. Further research is required to establish greater knowledge of the effectiveness of these interventions.

The tasks of future researchers is to be knowledgeable of important dynamic issues related to working in a post-disaster environment, as well as improving research design and investigating more complex explanatory models.

Dynamic understanding includes the post disaster phases during which communities, school authorities and parents are open to assistance. The initial disaster period is dominated, rightfully so, by human needs relating to safety, shelter, provision of food and water and treatment of illness and injury. During this stage community and government responses are demonstrable and positive. Readily identifiable caring organizations such as the Red Cross provide this initial assistance. Following this initial phase, with safety and shelter needs having been met, communities often seem willing to address interpersonal and mental health issues. During this stage a major project, such as screening children may be undertaken, however, only if the research team includes individuals who have local standing and the trust of the local community. Local collaborators establish the project and researcher's credibility with decision makers such as school principals. The service provider or researcher in the post-disaster domain must be able to work collaboratively with consumers and local authorities, without such skills no level of evidence base will ensure an intervention is supported.

This research was limited by having no dedicated research funding. Following disasters funding from government and from direct public contribution is often available to organizations such as the Red Cross. Such money is rarely directed towards research and development. Further, given the unpredictable nature of natural disasters and the extremely short time frame from disaster to instigation of a

research project, the usual research grant funding process is not applicable to research in this area.

Research development in the area should consider several key questions. An over-arching consideration is the breadth of the model being studied. Meiser-Stedman (2002, p219) concluded, "...it remains the case that such research [PTSD in children] is rarely driven by a coherent model that explains the processes that are involved in specific PTSD symptoms..." This was the case for the original SBTP studies. Subsequent investigations after the Canberra 2003 bushfires (chapter 14) were influenced by a lifespan developmental model (Pynoos, Steinberg & Wraith, 1995; McDermott, 2005). Vernberg and colleagues (1996) studying children exposed to a hurricane were one of the first groups to test an a priori model.

Future research, whether primarily studying single or complex post-disaster relationships should be influenced by contemporary theoretical models. In the adult PTSD literature cognitive models proposed by Brewin and colleagues (1996), and Ehlers and Clark (2000) focus on alterations in memory following traumatic events. Ehlers and Clark argue the presence of a 'trauma memory' is fundamental to subsequent exaggerated perception of current threat, dysfunctional trauma-related cognitions and coping behaviours (2000). Meiser-Stedman reviews this literature and speculates on applying this model to children and adolescents.

It is now well established that variance in the post-disaster mental health outcome is accounted for by both individual vulnerability factors as well as disaster-related factors. In children's post-disaster responses the role of the parent, issues such as communicated anxiety from a parent and the effect of the parent's disaster coping response have not been clearly established. Other factors that need further investigation include individual differences in genetic vulnerability and resilience factors. Further, few studies have investigated impairment beyond the burden of increased psychopathology and few studies have published follow-up longer than two years post-disaster. The importance of the lack of longer term outcome research is that little is known about effects of disaster psychopathology on the child's developmental trajectory. Lastly, very little is known about interventions in the post-disaster period. Questions include the utility of universal versus selected interventions, the role of family and school milieu in short and longer term outcome, whether family approaches are the treatment of choice and the relative effectiveness of programs for individuals at different developmental stages.

Communications to the author suggest that publications from this research have been influential in the child and adolescent disaster field and have stimulated others to provide services and undertake research in the very challenging post-disaster environment. A major contribution by this research is the successful application of public health strategies such as screening, so effectively employed in areas of internal medicine, to this area of child and adolescent mental health.

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